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BUREAU OF MINES

VAN. H. MANNING, DIRECTOR

THE DETERMINATION OF NITROGEN IN SUBSTANCES USED IN EXPLOSIVES

BY

W. C. COPE AND GUY B. TAYLOR

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THE DETERMINATION OF NITROGEN IN SUBSTANCES USED IN EXPLOSIVES.

By W. C. Cope and Guy B. Taylor.

INTRODUCTION.

Among the more important and frequent determinations an analyst of explosives may have occasion to make is that of nitrogen. The use of nitrosubstitution compounds in all classes of explosives is becoming widespread, and a knowledge of the nitrogen content of such compounds is most useful as an aid in identifying them and testing their purity.

The Bureau of Mines has had frequent requests for the methods used in its laboratories for determining nitrogen in nitroderivatives. This report covers not only these methods, but the methods used for all classes of compounds containing nitrogen that are used in explosives.

ACKNOWLEDGMENT.

The authors desire to acknowledge the assistance given by J. H. Hunter, J. E. Crawshaw, and C. A. Taylor, of the Bureau of Mines, who made many of the determinations necessary in working out the methods.

DUMAS METHOD FOR NITROGEN DETERMINATIONS.

The Dumas method of determining nitrogen is generally considered applicable to all classes of organic substances. However, it is difficult, tedious, and time consuming, and for these reasons its use is restricted to checking other methods and to the analysis of substances not readily yielding to other treatment. The successful use of the Dumas method requires attention to a great many details.

PREPARATION OF COPPER OXIDE.

Practically all samples of cupric oxide contain traces of nitrogen that may cause serious errors in determinations by the Dumas method. As early as 1843, Erdmann and Marchand[a] showed that

[a] Erdmann, O. L., and Marchand, R. F.,; Ueber die Atomgewichte des Wasserstoffes und des calciums: Jour. prakt. chemie, Bd. 26, 1843, p. 461.

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small quantities of air were held by CuO. Frankland and Armstrong[a] found that CuO made from nitrate contained both carbon dioxide and nitrogen.

Richards[b], who has done some very precise work on this subject, found that CuO prepared by ignition of oxynitrate contained four or five times its volume of occluded gases which could be partly expelled by heating to bright redness. Gas from the air was not absorbed upon cooling. Samples prepared in different ways contained very different amounts of gas, and material heated to 300° C. contained less nitrogen than that which had been heated to a higher temperature. Certain copper oxides were found to contain 0.088 per cent occluded nitrogen gas and 0.004 per cent occluded oxygen.

Work in the explosives chemical laboratory of the Bureau of Mines has shown that for the Dumas determination copper oxide must be especially prepared to free it of nitrogen.[c] Wire-form copper oxide is ground and sieved to two sizes, the coarse remaining on a 20-mesh screen and the fine on an 80-mesh screen, that passing through the 80-mesh screen being rejected. The oxide as received, or from the oxidation in an open iron dish of that used in previous determinations, is placed in a fused silica tube, 1 inch in diameter and 36 inches long. At one end of this tube is placed a roll of copper gauze and an asbestos plug occupying about 3 inches of the tube. The tube is then filled the length of the heating zone with the copper oxide. The ends of the tube are closed with one-hole rubber stoppers carrying glass T-tubes with stopcocks as shown in figure 1. At one end is connected a vacuum pump and the carbon-dioxide generator, and at the other end a manometer and the usual form of potassium hydroxide absorption burette (Schiff nitrometer). The tube is heated under vacuum, preferably in an electric furnace, to full red heat, the maximum temperature being about 950° C. for about 30 minutes. The pressure is then restored with carbon-dioxide gas, and this gas is passed through the tube for an hour. These treatments are continued alternately until no accumulation of gas is formed in the potassium hydroxide burette in a 30-minute run. About three days are required for the fine oxide and one day for the coarse. The oxide is allowed to cool in a stream of carbon-dioxide gas, removed, and placed in sealed bottles for use as needed.

CARBON DIOXIDE GENERATOR.

The carbon dioxide generator used was developed in this laboratory and is similar to one described by Young and Caudwell.[d] It consists

[a] Frankland, E., and Armstrong, H. E., On the analysis of potable waters: Jour. Chem. Soc., vol. 21, 1868, pp. 89–93.

[b] Richards, T. W., A revision of the atomic weight of copper: Proc. Am. Acad., vol. 26, 1891, p. 276.

[c] See also Fieldner, A. C., and Taylor, C. A., Determination of nitrogen in coal: Tech. paper 64, Bureau of Mines, 1915, pp. 14–18.

[d] Young, G., and Caudwell, B., Apparatus for the supply of carbon dioxide in the determination of nitrogen in organic compounds by the absolute method: Jour. Soc. Chem. Ind., vol. 26, 1907, pp. 184–185.

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of a 12-liter bottle with a tap at the bottom, containing sulphuric acid (1:1) and a smaller and similar bottle from which potassium carbonate solution is run into the large bottle as shown in figure 2. The construction may be understood from the figure. The carbonate solution enters the generator through a mercury seal and drips out of a small hole near the top of the test tube. Two holes are provided, one being about a centimeter above the other, so that if the lower one becomes clogged from the crystallization of salt, the solution will run out the top one and dissolve the salt.

In starting up the generator, the large bottle is filled with sulphuric acid (1:1) solution to within 2 or 3 centimeters of the outlet

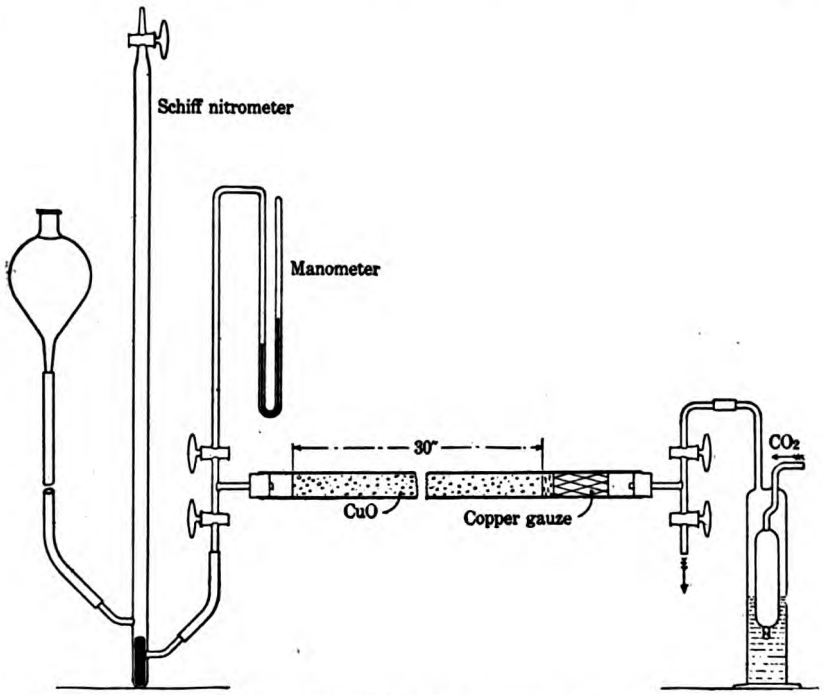

FIGURE 1.—Apparatus for preparing copper oxide for determination of nitrogen by Dumas method.

holes for the potassium carbonate solution (450 grams to the liter), which is started running in. As soon as the air in the bottle has been displaced the stopcock at the bottom of the generator is opened and the acid drawn off under pressure of carbon-dioxide gas until the bottle is about one-fifth filled with acid. The apparatus is now ready for use and furnishes such pure carbon dioxide that all gas run into the potassium-hydroxide burette for a period of 30 minutes, at the normal rate used in determinations, is completely absorbed. This generator will last several months under normal conditions of use without recharging.

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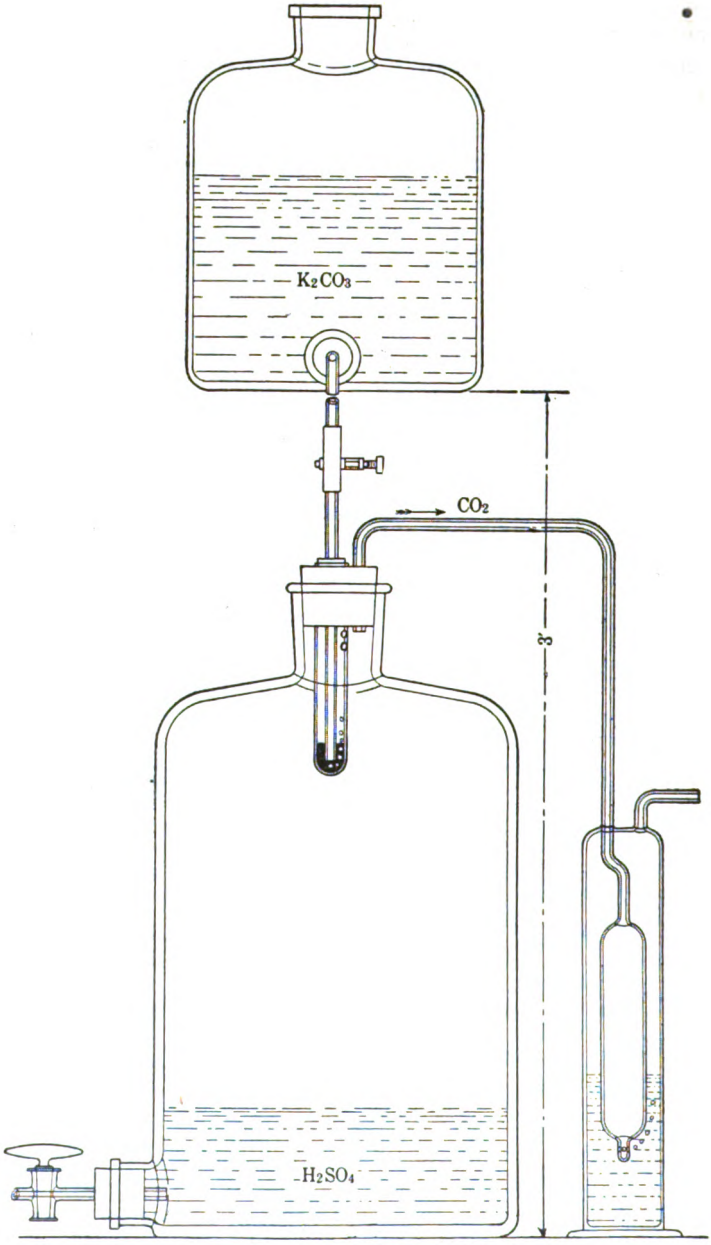

FIGURE 2.—Carbon dioxide generator.

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PROCEDURE IN CONDUCTING TESTS.

A fused silica tube five-eighths of an inch in diameter and 36 inches long is charged as indicated in figure 3. After the tube has been charged from the right end to the asbestos plug, a mixture of the sample (0.1200 to 0.5000 gram) and 10 grams of fine copper oxide are added through a long stem funnel, followed by 10 grams of fine oxide to clean the funnel. This mixture occupies about 2 inches in the tube. Coarse oxide is poured in on top and the second roll of copper gauze inserted.

The tube is so placed in an electric or gas furnace that each end projects about 2 inches from the furnace. It is necessary to cool the rubber stoppered ends, and this is done by circulating water through small brass jackets. The ends are connected to the generator and the potassium hydroxide burette, and the carbon dioxide gas started through. Heat is then applied to within 2 inches of the fine oxide containing the sample, and after 30 minutes the gas is tested for complete absorption. As soon as such a test shows the tube to be free from air, the potassium hydroxide burette is filled and the heat slowly applied to the whole tube so as to regulate the evolution of the nitrogen. After 20 to 30 minutes, the gas evolution slows down and then a stream of carbon-dioxide gas is passed through the tube at full red heat for five minutes. The heat is turned off and the tube allowed to cool with the carbon dioxide still flowing. The nitrogen collected over the potassium hydroxide is allowed to stand for about 2 hours and is then transferred to a water-jacketed reading burette. The pressure is adjusted to that of the prevailing atmospheric pressure, the barometric pressure and the temperature being noted. The volume of gas is reduced to weight of nitrogen by the following formula:

$$g = V\frac{273}{273+t}\cdot\frac{b-w}{760}\cdot(0.001251)$$

In this formula g is weight in grams, V the volume in cubic centimeters of the nitrogen in the burette, b is the barometer reading in millimeters, and w the vapor tension of water at the temperature t°C. Or the volume may be reduced to weight by referring to the nitrogen table (Table 1) on page 22.

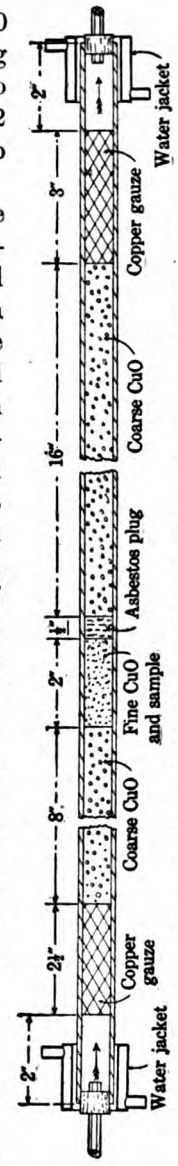

FIGURE 3.—Diagram showing method of loading combustion tube for determination of nitrogen by Dumas method

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The combustion tube is kept tightly stoppered when not in use and with an atmosphere of carbon dioxide in the tube. When ready for another test, the copper gauze and the coarse copper oxide up to the asbestos plug are removed, and the gauze and coarse oxide used again. The coarse oxide can be used for at least six determinations. With copper oxide prepared as above and the type of generator indicated no blanks are necessary. It is well to check the apparatus occasionally with pure picric acid. Results of tests with this material showed from 18.25 to 18.40 per cent nitrogen, the theoretical content being 18.34 per cent.

MODIFIED KJELDAHL METHOD.

The Kjeldahl method for nitrogen has the merit of simplicity. One operator may run a number of determinations simultaneously and for substances for which the method is suitable it is accurate. The literature of the various modifications of the Kjeldahl process is particularly voluminous and a review here would serve no useful purpose. All of the various suggestions found in the literature that seemed to offer any promise of success in developing a modification adaptable to all nitro derivatives have been tested from time to time in the bureau's explosives laboratory. The method finally evolved is a modified Kjeldahl-Jodlbauer-Gunning [a] method.

The essential features of the Kjeldahl process are too well known to require any detailed description. The modifications for nitrates generally have as their basis the addition of a substance that may be easily nitrated in the concentrated acid mixture. The nitro compounds thus produced are then reduced by suitable means to amines and finally to ammonia. In the special case of nitro derivatives, the difficulty seems to lie in obtaining a reduction process that is generally applicable without loss of nitrogen. Some nitro derivatives, such as tretanitroaniline and tetranitromethylaniline seem to decompose on contact with concentrated sulphuric acid, even before reduction is attempted.

According to the Jodlbauer method, reduction is effected with zinc dust. After the zinc is added the flask is set aside for four hours. This fact seems to have been lost sight of by many recent workers in this field. Losses of nitrogen occur if the temperature is allowed to rise during the reduction process or if heating is begun too soon after the addition of zinc. Upon this point depends the success of the Bureau of Mines method. The reduction must be accomplished in

[a] Kjeldahl, J., Neue Methode zur Bestimmung des Stickstoffes in organischen Körpern: Ztschr. anal. Chem., Jahrg. 22, 1883, p. 366; Wilfarth, H., A modification of Kjeldahl's method: Jour. Am. Chem. Soc., vol. 7, 1885, p. 291; Jodlbauer, M., Die Bestimmung des Stickstoffes in Nitraten nach der Kjeldahl'schen Methode: Chem. Zentralbl., Jahrg. 17, 1886, p. 433; Gunning, J. W., Über eine Modification der Kjeldahl-Methode: Ztschr. anal. Chem., Jahrg. 28, 1889, p. 188; Asbóth, A., Über allegemeiner Anwendung der Kjeldahl'schen-Methode der Stickstoffbestimmung: Chem. Zentralbl. Jahrg. 17, 1886, p. 161.

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the cold. Three analyses of trinitrotoluene were made, the flask being heated overnight at 70° C. in an oven after the addition of zinc. The results were 17.87, 17.83, and 18.02 per cent nitrogen, as compared with 18.50 per cent theoretical content and 18.35 to 18.48 per cent obtained by reduction in the cold. The results under the same conditions for liquid trinitrotoluene (crude liquor), heated to only 52° C. ranged from 15.37 to 16.12 per cent nitrogen, as against four concordant determinations, by reduction in the cold, showing 16.18, 16.19, 16.21, and 16.16 per cent. Many other tests in which the flasks after addition of zinc were heated over electric globes to only moderate temperatures almost invariably resulted in loss of nitrogen.

ANALYTICAL METHODS.

About one-half gram of nitro compound is accurately weighed into a 500 c. c. Kjeldahl flask, dissolved in 30 c. c. of sulphuric acid containing 2 grams of salicylic acid,[a] and reduced in the cold with zinc dust. After standing overnight the acid mixture is digested as indicated below, and the ammonia distilled into standard acid as usual. Attention to the following details are essential to the success of the method.

REAGENTS.

The following reagents, prepared as indicated, are necessary: Salicylic acid solution, prepared by dissolving 40 grams in 600 c. c. of H_2SO_4 (96 per cent pure); potassium sulphide, 80 grams in one liter of water; sodium hydroxide, 750 grams in one liter of water; potassium sulphate, powdered; mercuric oxide (yellow); zinc dust; zinc, granulated; $\frac{N}{3}$ standard sulphuric acid; $\frac{N}{3}$ standard sodium hydroxide; and cochineal indicator.

WEIGHING THE SAMPLE.

Solids are weighed directly into an aluminum scoop on the balance pan. This scoop (fig. 4) has a cylindrical extension and lock pin that engages a long brass handle by means of which the sample may be introduced into the bottom of the flask without leaving any on the neck. A glass scoop, serving the same purpose, may be easily constructed by making a blade with a pointed handle and sticking the point in a rubber stopper in the end of a long glass tube.

Liquids may be introduced into the flask from a Lunge acid pipette. Mixtures that are part solid and part liquid are best dissolved in a small beaker with 10 c. c. acid mixture and washed into the flask

[a] In analyses of nitro compounds in which the nitrogen is already fixed in NO_2 groups, the function of the salicylic acid is not clear, but its use is necessary in order to obtain accurate results. See Dyer, B., Kjeldahl method for determination of nitrogen, Jour. Chem. Soc. vol. 67, 1895, pp. 811–817.

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through a funnel with the remaining required acid mixture. Semiliquids not containing volatile mono compounds may be dissolved in ether and the ether evaporated from the flask.

SOLUTION OF THE NITRO COMPOUND.

Trustworthy results are only obtained when the nitro compound is completely dissolved before reduction is attempted. Some compounds dissolve easily in the cold, but heating on a steam bath is necessary with most solids.

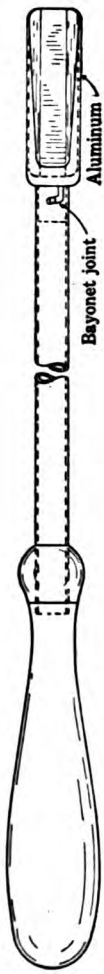

FIGURE 4.—Scoop for introducing samples into Kjeldahl flask.

REDUCTION.

Powdered zinc (2 grams) is added in small portions at a time through a long-stemmed funnel, while the flask is shaken and cooled. It is advisable to keep the flask immersed in cold water. When all the zinc has been added, the flask is shaken at 15-minute intervals for about 1½ hours and then allowed to stand overnight in the cold.

Sodium thiosulphate, used as a reducing agent in place of zinc, gives good results on pure trinitrotoluene, but seems to give incomplete reduction with mononitrotoluene, and therefore its use is not recommended.

DIGESTION.

After reduction has taken place, the flask is placed over a low naked flame and heated for 1½ to 2 hours, during which time copious white fumes are evolved. The flame is then turned up and the acid mixture is boiled 1¼ to 2 hours, the flask being turned at intervals. Care should be taken to keep the flame below the level of the mixture to avoid loss by volatilization. The flask is then cooled slightly and 1 gram of HgO added. Boiling is continued about 1½ hours, or until the acid becomes colorless. Then 7.5 grams of K_2SO_4 and 10 c. c. of H_2SO_4 are added and boiling is continued for 1½ to 2 hours longer. The composition of the mixture in the flask should not be allowed to approach too closely the composition represented by the formula $KHSO_4$, or ammonium salts may be lost.[a]

If the mixture is colorless, the digestion is now complete, but if there are any brown particles, 1 gram of K_2SO_4 is added and the boil-

[a] Self, P. A. W., An unrecognized source of error in the Kjeldahl-Gunning method for the determination of nitrogen. Pharm. Jour., vol. 88, 1912, pp. 384–5; Carpiaux, E., Sur une cause d'erreur dans la méthode Kjeldahl-Gunning. Bull. soc. chim. Belgique, vol. 27, 1913, pp. 13–14.

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ing continued one-half to 1 hour. The flask is cooled and 250 c. c. of distilled water added to dissolve the solid in the flask.

DISTILLATION OF THE AMMONIA.

To the solution in the flask is added 25 c. c. of potassium sulphide solution, 1 gram of granulated zinc, and enough sodium hydroxide solution to make the mixture strongly alkaline; usually 85 to 90 c. c. is enough. This solution should be poured down the neck of the flask and mixing avoided until the flask is connected to the distilling apparatus. About 250 c. c. is distilled through a block tin condenser into 25 to 30 c. c. of $\frac{N}{3}$ standard acid, and the excess titrated with $\frac{N}{3}$ standard alkali solution; cochineal being used as an indicator.

The graduations on ordinary laboratory burettes often show considerable errors, and where accurate results are desired it is advisable to calibrate the burettes carefully. One-tenth of a cubic centimeter corresponds approximately to one-tenth per cent, and an error of calibration of this magnitude is not uncommon and certainly should not be overlooked.

PHOSPHORUS IODIDE METHOD.

The Chenel[a] method of reduction is applicable to some nitro compounds where the zinc-reduction method gives low results.

PROCEDURE IN ANALYSIS.

The procedure is as follows: Two grams of yellow phosphorus are weighed out under water, dried quickly by pressing between filter paper, and introduced into a 500 c. c. Kjeldahl flask containing 20 c. c. of carbon bisulphide. After the phosphorus is dissolved, 12 grams of iodine are added, and all the carbon bisulphide driven off by heating on a steam bath. The phosphorus iodide thus formed will loosen from the flask after a few minutes and may be broken up by shaking. The sample is added by means of the scoop or Lunge pipette, depending upon whether it is liquid or solid. If a mixture of solid and liquid, it may first be dissolved in ether and poured into the flash, and the ether driven off. The iodide is prepared in a beaker and added to the sample. It is essential to the success of the method not to get any of the sample on the neck of the flask.

To the mixture of iodide and sample is added 8 c. c. of water. After a minute or two a strong reaction occurs, during which the flask should be shaken. When this reaction ceases, the reduction is complete. A cooled mixture consisting of 30 c. c. of sulphuric acid

[a] Chenel, M. L., Memorial des poudres et salpètres, 1895–96, t. 8, p. 40.
Gody, L., Traité theorique et pratique des matières explosives, 1907, p. 510.

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and 50 c. c. of water is added when the flask has become cold. It has been found advisable to dilute the acid to prevent the violent heating that occurs when strong acid is used. The flask is then placed over a low flame until the water is boiled off. The heat is increased at this point, and when all the iodine is driven off, 1 gram of HgO is added and the boiling continued for one hour after the acid has become colorless. The ammonia is distilled as in the modified Kjeldahl process.

This method gives higher results for the dinitronaphthalenes than the zinc-reduction method, and therefore seems of more general application. It takes less time but requires more expensive reagents.

RESULTS BY THE THREE METHODS COMPARED.

The table following shows some results obtained by the different methods. Neither the modified Kjeldahl nor the phosphorus iodide method is applicable to tetranitroaniline or tetranitromethylaniline, and the Kjeldahl method also gives low results on dinitronaphthalene.

Results of tests by the Dumas, modified Kjeldahl, and phosphorus-iodide methods.

Sample.	Theoretical nitrogen content.	Nitrogen content as determined by—			Remarks.
		Dumas method.	Modified Kjeldahl method.	Phosphorus-iodide method.	
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	
Picric acid	18.34	18.20	18.36	.....	
		18.24	18.31	.....	
		18.32	18.28	.....	
		18.34	18.24	.....	
Mononitrophenol (ortho)	10.06	.....	9.90	.....	
		.....	9.84	.....	
Mononitrophenol (para)	10.06	.....	9.99	.....	
		.....	10.08	.....	
Dinitrobenzene (ortho)	16.67	.....	16.18	.....	
		.....	16.23	.....	
		.....	16.29	.....	
Dinitrobenzene (meta)	16.67	.....	16.51	.....	
		.....	16.58	.....	
		.....	16.63	.....	
Dinitrobenzene (para)	16.67	.....	16.39	.....	
		.....	16.39	.....	
		.....		.....	
Mononitrotoluene (ortho)	10.21	.....	10.06	9.98	
		.....	10.11	10.03	
		10.30	10.20	.....	
		.....	10.06	.....	
Mononitrotoluene (ortho)	10.21	.....	10.16	.....	Redistilled.
		.....	10.19	.....	Do.
		.....	10.14	.....	Do.
		.....	10.20	.....	Do.
Mononitrotoluene (ortho)	.....	.....	9.62	.....	Crude.
		.....	9.61	.....	Do.
Dinitrotoluene (liquid)	.....	15.79	15.39	.....	Mother liquor, mixtures of nitrotoluenes.
		15.77	15.40	.....	Do.
		.....	15.45	.....	Do.
Trinitrotoluene (liquid)	.....	.....	16.18	.....	Do.
		.....	16.19	.....	Do.
		.....	16.21	.....	Do.
		.....	16.18	.....	Do.

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Results of tests by the Dumas, modified Kjeldahl, and phosphorus-iodide methods—Con.

Sample.	Theoretical nitrogen content.	Nitrogen content as determined by—			Remarks.
		Dumas method.	Modified Kjeldahl method.	Phosphorus-iodide method.	
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	
Trinitrotoluene (2, 4, 6)	18.50	18.43	18.41	18.54	
		.....	18.48	18.38	
		.....	.....	18.45	
Do	.....	.....	18.36	.....	
Do	.....	.....	18.30	.....	
		.....	18.38	.....	
Do	.....	18.38	18.24	.....	
		.....	18.29	.....	
Nitroaniline (meta)	20.25	.....	20.04	.....	
		.....	19.92	.....	
Tetranitroaniline	25.63	25.62	.....	(21.80)	
		.....	.....	(21.75)	
Tetranitromethylaniline (trinitrophenylmethylnitramine)	24.40	24.37	(21.30)	(20.37)	
		.....	(21.50)	(21.60)	
		.....	(21.56)	(20.03)	
Mononitronaphthalene	8.09	8.16	8.08	.....	
		.....	8.04	.....	
Dinitronaphthalene (1:5)	12.84	.....	(11.89)	12.72	
		.....	(12.09)	.....	
		.....	.....	12.54	
Dinitronaphthalene (1:8)	12.84	.....	.....	12.97	
		.....	.....	12.82	
Lead azide	28.85	28.45	.....	.....	
Sodium azide	64.60	64.29	.....	.....	

DETERMINATION OF NITROGEN IN NITRATES.

DU PONT NITROMETER.

Nitrogen in the form of nitrate, organic or inorganic, is readily determined by the du Pont nitrometer. The following description of this instrument, which is shown in Plate I, is reprinted from Bureau of Mines Bulletin 51.[a]

DESCRIPTION OF NITROMETER.

This instrument[a] consists of six glass parts as follows: A globe-shaped reservoir (*a*); a generating bulb (*b*) of about 300 c. c. capacity, the generating bulb having stopcocks at both top and bottom to permit a violent agitation, and having a cup above which communicates with the bulb through the upper stopcock; a second globe-shaped reservoir (*c*), to which, by means of a glass multiple connecting tube and rubber tubing, are joined a compensating burette (*d*), a reading burette (*e*), and an additional measuring burette (*f*). The reading and compensating burettes are of the same shape and size, and are blown out into bulbs at the top. The compensating burette is not graduated. Above the bulb it has a small vertical open tube, which is sealed when the instrument is standardized. The reading burette is calibrated so that percentages of nitrogen may be read therefrom, and is marked to read from 10 to 14 per cent, being graduated to one-hundredths of 1 per cent. Between 171.8 and 240.4 c. c. of gas must be generated to obtain a reading; that is, the 10 per cent mark

[a] Snelling, W. O., and Storm, C. G., The analysis of black powder and dynamite; Bull. 51, Bureau of Mines, 1913, pp. 35–38. Snelling and Storm state that the description was taken largely from a paper by J. R. Pitman, The analysis of nitric and mixed acids by du Pont's modification of the Lunge nitrometer, Jour. Soc. Chem. Ind., vol. 19, 1900, p. 983; see also Lunge, G., Du Pont's nitrometer, Jour. Soc., Chem. Ind., vol. 20, 1901, p. 100.

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represents the volume of 171.8 c. c. of NO at 20° C. and 760 mm. pressure, containing 0.1 gram of nitrogen; the 14 per cent mark is equal to 240 c. c. NO under the same conditions, representing 0.14 gram nitrogen.

The compensating burette is supported by a ring; the generating bulb is supported just above each stopcock by forked holders, curved so as to retain the bulb in place. In order to remove the generating bulb it needs only to be raised slightly and brought forward, the manipulation of a screw, as with an ordinary clamp, being thus avoided. The two reservoirs and the reading burette are supported by ring clamps, these clamps having milled rollers at the shank; they are moved up and down vertical racks by means of hand screws, the rollers being so arranged in conjunction with the vertical racks that the weight of the part presses them down and acts as a brake, thus preventing their moving when not being manipulated.

STANDARDIZATION WITH DRY AIR.

Having arranged the apparatus and filled the compensating, reading, and generating tubes as well as their connections with mercury, the next step is to standardize the instrument. Twenty to thirty c. c. of sulphuric acid is run into the generating bulb through the cup at the top, and at the same time about 210 c. c. of air is let in; the cocks are then closed and the bulb is well shaken; this shaking thoroughly desiccates the air, which is then run into the compensating burette until the mercury is about on a level with the 12.50 per cent mark on the reading burette, the two burettes being held at the same height. The compensating burette is then sealed off at the top. A further quantity of air is desiccated in the same manner and run over into the reading burette until the height of mercury in the reading burette stands at about the 12.50 per cent mark. The cocks are then closed, and a small piece of glass tubing, filled with sulphuric acid (not water), and bent in the form of a U, is attached to the outlet of the reading burette. When the mercury columns are about balanced and the inclosed air has been cooled to room temperature, the cock is again carefully opened and when the sulphuric acid balances in the U-tube, and the mercury columns in both burettes are therefore at the same level, the air in each tube is subject to the same conditions, namely, atmospheric temperature and pressure. A reading is now made from the burette, and the barometric pressure and temperature are carefully noted. Using the well-known formula

$$V=\frac{V'P'(273+t)\ (1-0.00018t')}{P(273+t')\ (1-0.00018t)}$$

he volume this inclosed air would occupy at a pressure (P) of 29.92 inches of mercury (760 mm.) and at a temperature (t) of 20° C. is determined. The cock is again closed and the reservoir and reading burette carefully adjusted so as to bring the air in the reading burette to the calculated volume and the mercury in the compensating burette to the same level as the mercury in the reading burette. A strip of paper is now posted on the compensating burette at the level of the mercury, and the standardization is then complete.

STANDARDIZING WITH POTASSIUM NITRATE.

There is, however, another and shorter method of standardization than the one described above. It is well known that the quality of the sulphuric acid used in the nitrometer will materially affect the results. To ascertain whether sulphuric acid is suitable for use in making nitrogen determinations in the nitrometer a determination is made on chemically pure dry potassium nitrate and the reading obtained in the nitrometer is compared with the theoretical percentage of nitrogen in potassium nitrate. In applying this procedure to the standardization of the nitrometer the compensating burette is filled with desiccated air, as described above, and 1 gram of potassium nitrate, dissolved in 2 to 4 c. c. of water, is introduced into the generating bulb, the cup is washed with 20 c. c. of 95 to 96 per cent sulphuric acid in three or

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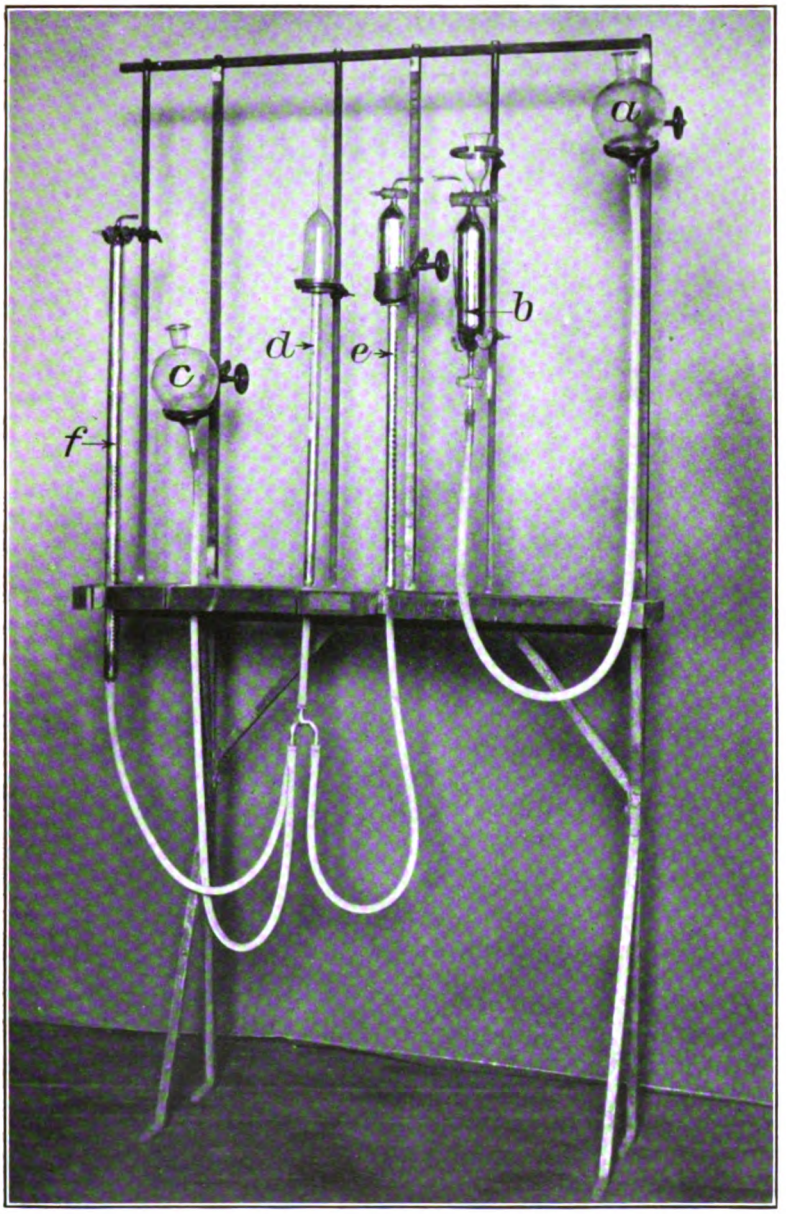

NITROMETER.

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four portions, and each portion is run separately into the bulb. The gas, when generated, is run over into the reading burette, and the mercury columns in both burettes are leveled, so that the mercury in the reading burette is also at 13.86, the theoretical percentage of nitrogen in potassium nitrate. A strip of paper is pasted on the compensating burette at the level of the mercury, and the standardization is then accomplished.

This method of standardizing offers many advantages over that first described, among which may be mentioned that no readings of temperature or pressure are necessary. Probably the greatest advantage is that if the acid used in standardizing should contain impurities, which might otherwise affect the result, the error is entirely compensated and corrected in subsequent work; that is to say, the instrument having been so standardized that the reading gives the theoretical percentage of nitrogen in potassium nitrate, the results will be accurate when testing other substances so long as the same quantity of sulphuric acid from the same lot is used.

It must, of course, be understood that once having standardized the instrument with a certain lot of acid no different lot of acid can be used without restandardizing. In order to avoid slight differences in results due to variations in the acid, it is advisable to reserve a sufficiently large uniform stock of acid—for example, a carboy full—for nitrometer use.

USE OF "UNIVERSAL MEASURING BURETTE."

The additional measuring burette, with which this type of nitrometer is provided, known as the "universal tube" (*f*, Plate I), is simply a straight burette, marked to read from 0 to 100 in percentages and graduated to one-tenth of 1 per cent. The tube is of such a size that 0.30 gram of NO (or 1/100 gram-molecule of NO) under standard conditions of temperature and pressure (20° C. and 760 mm. pressure) fills it to the 100 mark.

If it is desired to read the percentage of nitrogen direct, 0.14 gram of substance is weighed out. Consequently, if 1.011 grams of potassium nitrate, 0.63 gram of nitric acid, or 0.85 gram of sodium nitrate are used, the results can be read directly as percentages of the original substance.

This method is convenient when it is not certain that the reading will fall within the limits of the graduations in the ordinary measuring burette.

The "universal tube" is found particularly advantageous when, for example, the amount of nitroglycerin in a sample is so small that the volume of gas generated is insufficient to fill the large reading burette to its graduated portion. The volume of gas generated from any amount of nitroglycerin up to about 0.75 gram may be read in the "universal tube." Readings in this measuring tube can be as accurately made as in the regular reading burette.

PROCEDURE IN USING.

The sample is weighed into a small beaker and dissolved in 5 to 10 c. c. of sulphuric acid with a specific gravity of 1.84 (inorganic nitrates may be previously dissolved in as little water as possible) and transferred to the generating bulb. The beaker and the cup of the nitrometer are rinsed several times with acid, the washings being rinsed into the bulb. By lowering the leveling bulb and gently shaking NO begins to be evolved. When all but 60 to 75 c. c. of mercury has run out of the generating bulb, the bottom stopcock is closed and the bulb shaken violently three to five minutes. The gas is then transferred to the reading burette, the levels adjusted, and the reading obtained. Care must be taken not to use samples that are too large or too small to fall within the range of the graduations on the burette.

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INTERFERING SUBSTANCES.

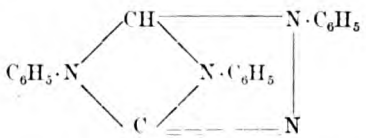
Certain nitro compounds, notably mononitrotoluenes [a] (dinitrotoluenes and trinitrotoluenes do not interfere with nitrogen determinations) which are capable of being further nitrated, and many oils, greases,[b] etc., convert part of the nitric nitrogen into fixed nitro groups, making the results of the nitric nitrogen determination with the nitrometer too low. In such cases the nitrate should be separated from the interfering substance by a suitable solvent.[b] Hyde's [c] method is useful in separating nitro compounds from glycerin nitrates (nitroglycerin). It depends upon selective solubilities in carbon bisulphide and acetic acid-water mixtures.

LUNGE NITROMETER.

The Lunge nitrometer, which requires less mercury and is a less costly piece of apparatus than the modification already described, is preferred by some chemists, but more calculation of results is necessary. The details of operation may be found in text books on quantitative analysis.[d] Factors for reducing the readings on this instrument to percentages of nitrogen are given in Tables 2 and 3 on pages 23 to 44.

NITRON METHOD.[e]

Inorganic nitrates may be precipitated from water solution with nitron, 1:4 diphenyl 3:5 endoanilo dihydro triazol ($C_{20}H_{16}N_4$), which



forms an addition product with one molecule of HNO_3. The reagent is prepared by dissolving 1 part of nitron in 9 parts of 5 per cent acetic acid with the aid of heat, filtered, and preserved in dark bottles. The solution does not keep well, hence is best prepared in small quantities.

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a Storm, C. G., Effect of nitrotoluenes on the determination of nitroglycerin by means of the nitrometer: 8th Int. Cong. Appl. Chem., vol. 4, 1912, p. 117; The analysis of permissible explosives: Bull. 96, Bureau of Mines, 1916, p. 41.

b Storm, C. G., The analysis of permissible explosives: Bull. 96, Bureau of Mines, 1916, p. 41.

c Hyde, A. L., Quantitative separation of nitro-substitution compounds from nitroglycerin: Jour. Am. Chem. Soc., vol. 35, 1913, p. 1173. Also given in detail by Storm, C. G., The analysis of permissible explosives: Bull. 96, Bureau of Mines, 1916, pp. 47–50.

d See Lunge, G., and Berl, E., Chemisch-technische Untersuchungsmethoden, Bd. 1, 1910–11, pp. 156–179.

e Storm, C. G., The analysis of permissible explosives: Bull. 96, Bureau of Mines, 1916, pp. 60–62; Busch, M., Gravimetrische Bestimmung der Salpetersäure: Ber. Deut. chem. Gesell., Jahrg. 38, 1905, p. 861; Gutbier, A., Die Gewichtsanalytische Bestimmung der Salpetersäure mittels "Nitron" nach M. Busch: Ztschr. angew. Chem., Jahrg. 18, 1905, p. 494; Hes, A., Über die Gewichtsanalytische Bestimmung der Salpetersäure: Ztschr. anal. Chem., Jahrg. 48, 1909, p. 81.

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To a solution of the nitrate, containing preferably 0.10 to 0.15 grams in 80 c. c. of solution, 12 to 15 drops of dilute H_2SO_4 is added. This mixture is heated to the boiling point and 12 to 15 c. c. of the nitron reagent added, then it is stirred and let stand one-half to three-fourths of an hour. Long, silky needles separate on cooling. The beaker is placed in ice water for 1 or 2 hours and the contents filtered on a Munroe or Gooch crucible, being washed with ice water, 1 or 2 c. c. at a time, and not more than 10 c. c. in all. A portion of the filtrate may be used to clean the beaker. The precipitate is dried at 105 to 110° C.; an hour usually is sufficient. To insure complete precipitation, a little more reagent is added to the heated filtrate and cooled as before. The molecular weight of nitron nitrate is 375.2. The nitrogen factor is therefore 0.03734.

Moderate amounts of chlorides or sulphates do not interfere with nitrogen, but bromides, iodides, chromates, chlorates, and perchlorates are precipitated. Picric acid may be quantitatively precipitated by nitron,[a] according to the procedure outlined. The results of tests at this laboratory show that the method is very accurate; 0.2006 and 0.2008 grams of ammonium picrate were taken, and 0.2007 and 0.2008 grams, respectively, were found. A modification for nitrocellulose was also found to be accurate.[b] In one test 0.2 gram of a sample of nitrocellulose was heated on a steam bath with 5 c. c. of a 30 per cent solution of NaOH and 10 c. c. of 3 per cent hydrogen peroxide (H_2O_2) solution until frothing ceased and solution was nearly complete. Complete solution was effected by boiling. Then 40 c. c. of water and 10 c. c. of the peroxide were added and the whole heated on a steam bath to a temperature of about 50° C. and 40 c. c. of a 5 per cent H_2SO_4 solution was delivered from a pipette to the bottom of the mixture. The acid was mixed with the solution, which became acid in reaction, and the mixture heated to 80° C., when the nitron reagent was added. From this point the procedure was the same as for inorganic nitrates. The results showed 13.13 and 13.11 per cent nitrogen, as compared with 13.15 per cent obtained with the nitrometer.

RECOVERY OF REAGENTS.

The filtrate and washings are made slightly alkaline with ammonia and the precipitated nitron washed with water. The nitron nitrate precipitates are added to dilute ammonium hydroxide, warmed to 60° C., and the nitron filtered quickly, washed with cold water, and

[a] Busch, M., and Blume, G., Quantitative Bestimmung der Pikrinsäure: Ztschr. angew. Chem., Jahrg. 21, 1908, p. 354.

[b] Busch, M., Neue Methode zur Bestimmung des Stickstoffgehalts der Nitrozellulose: Ztschr. angew. Chem., Jahrg. 19, 1906, p. 1329.

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dried in a vacuum. Decomposition may be avoided by conducting the operation in an atmosphere of inert gas and away from light as much as possible.

USEFUL TABLES FOR NITROGEN DETERMINATIONS.

The tables following will be found useful by explosives chemists in making nitrogen determinations. Table 1 shows the weight in milligrams at various temperatures of 1 c. c. of moisture-saturated nitrogen.

Tables 2 and 3 are for the reduction of readings on the Lunge nitrometer to percentages of nitrogen. The data in these tables, compiled by B. Trexler, were furnished by C. R. Borland, of the American Smokeless Powder Co. The figures are applicable to the bulb form of the Lunge nitrometer having graduation marks starting at about 100 c. c., and are especially adapted for substances containing 10 to 13.7 per cent nitric nitrogen, such as nitrocellulose, nitrostarch, for example.

Table 2 gives factors at various temperatures and pressures for reducing the observed volume of nitric oxide to standard conditions (0° C. and 760 m. m. pressure) according to the following formula:

$$\frac{\text{Number of c. c. in nitrometer} \times \text{factor}}{100} = \text{corrected volume in cubic centimeters.}$$

Table 3 gives the percentages of nitrogen corresponding to various weights of substance taken for analysis and to the corrected volume of nitric oxide gas in the nitrometer as obtained by the use of Table 2. The vertical column at the left gives the weight in milligrams and the headings at the top give the corrected volume in cubic centimeters at 0° C. and 760° m. m. pressure. These results are based on the value 0.0006267 grams nitrogen per c. c. of NO, whereas more recent results have shown this value to be 0.0006257. Where especial accuracy is required the percentage shown in the table should be multiplied by the factor 0.998, or a correction applied by subtracting 0.03 per cent from all percentages below 11.60 and 0.04 per cent from all percentages above 11.60.

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TABLE 1.—*Weight of 1 c. c. of moist nitrogen in milligrams at various temperatures and pressures.*[a]

Temperature, ° C.	Barometric pressure, mm. of mercury.																						
	726	728	730	732	734	736	738	740	742	744	746	748	750	752	754	756	758	760	762	764	766	768	770
15	1.114	1.117	1.120	1.123	1.127	1.130	1.133	1.136	1.139	1.142	1.145	1.149	1.152	1.155	1.158	1.161	1.164	1.167	1.170	1.174	1.177	1.180	1.183
16	1.109	1.112	1.115	1.118	1.121	1.125	1.128	1.131	1.134	1.137	1.140	1.143	1.146	1.150	1.153	1.156	1.159	1.162	1.165	1.168	1.171	1.174	1.178
17	1.104	1.107	1.110	1.113	1.116	1.120	1.123	1.126	1.129	1.132	1.135	1.138	1.141	1.144	1.147	1.150	1.154	1.157	1.160	1.163	1.166	1.169	1.172
18	1.098	1.101	1.105	1.108	1.111	1.114	1.117	1.120	1.123	1.126	1.129	1.133	1.136	1.139	1.142	1.145	1.148	1.151	1.154	1.157	1.160	1.164	1.167
19	1.093	1.096	1.099	1.102	1.106	1.109	1.112	1.115	1.118	1.121	1.124	1.127	1.130	1.133	1.136	1.140	1.143	1.146	1.149	1.152	1.155	1.158	1.161
20	1.088	1.091	1.094	1.097	1.100	1.103	1.106	1.109	1.112	1.116	1.119	1.122	1.125	1.128	1.131	1.134	1.137	1.140	1.143	1.146	1.149	1.152	1.156
21	1.082	1.085	1.088	1.092	1.095	1.098	1.101	1.104	1.107	1.110	1.113	1.116	1.119	1.122	1.125	1.128	1.131	1.135	1.138	1.141	1.144	1.147	1.150
22	1.077	1.080	1.083	1.086	1.089	1.092	1.095	1.098	1.101	1.104	1.107	1.111	1.114	1.117	1.120	1.123	1.126	1.129	1.132	1.135	1.138	1.141	1.144
23	1.071	1.074	1.077	1.080	1.084	1.087	1.090	1.093	1.096	1.099	1.102	1.105	1.108	1.111	1.114	1.117	1.120	1.123	1.126	1.129	1.132	1.135	1.138
24	1.066	1.069	1.072	1.075	1.078	1.081	1.084	1.087	1.090	1.093	1.096	1.099	1.102	1.105	1.108	1.111	1.114	1.117	1.120	1.124	1.127	1.130	1.133
25	1.060	1.063	1.066	1.069	1.072	1.075	1.078	1.081	1.084	1.087	1.090	1.093	1.096	1.099	1.102	1.105	1.108	1.112	1.115	1.118	1.121	1.124	1.127
26	1.054	1.057	1.060	1.063	1.066	1.069	1.072	1.075	1.079	1.082	1.085	1.088	1.091	1.094	1.097	1.100	1.103	1.106	1.109	1.112	1.115	1.118	1.121
27	1.049	1.052	1.055	1.058	1.061	1.064	1.067	1.070	1.073	1.076	1.079	1.082	1.085	1.088	1.091	1.094	1.097	1.100	1.103	1.106	1.109	1.112	1.115
28	1.043	1.046	1.049	1.052	1.055	1.058	1.061	1.064	1.067	1.070	1.073	1.076	1.079	1.082	1.085	1.088	1.091	1.094	1.097	1.100	1.103	1.106	1.109
29	1.037	1.040	1.043	1.046	1.049	1.052	1.055	1.058	1.061	1.064	1.067	1.070	1.073	1.076	1.079	1.082	1.085	1.088	1.091	1.093	1.096	1.099	1.102
30	1.031	1.034	1.037	1.040	1.043	1.046	1.049	1.052	1.055	1.058	1.061	1.064	1.066	1.069	1.072	1.075	1.078	1.081	1.084	1.087	1.090	1.093	1.096

[a] This table is based on the weight of 1 liter of nitrogen at 0° C. and 760 mm., which is 1.2514 grams. Interpolations should be made for fractions of a degree and barometric pressures intermediate between those shown.

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure.*

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	3°	3.2°	3.4°	3.6°	3.8°	4°	4.2°	4.4°	4.6°	4.8°
775	100.86	100.79	100.71	100.64	100.57	100.50	100.43	100.35	100.28	100.21
774	100.73	100.66	100.58	100.51	100.44	100.37	100.30	100.22	100.15	100.08
773	100.60	100.53	100.45	100.38	100.31	100.24	100.17	100.09	100.02	99.95
772	100.47	100.40	100.32	100.25	100.18	100.11	100.04	99.96	99.89	99.82
771	100.34	100.27	100.19	100.12	100.05	99.98	99.91	99.83	99.76	99.69
770	100.21	100.14	100.06	99.99	99.92	99.85	99.78	99.70	99.63	99.56
769	100.08	100.01	99.93	99.86	99.79	99.72	99.66	99.58	99.51	99.44
768	99.95	99.88	99.80	99.73	99.66	99.59	99.53	99.45	99.38	99.31
767	99.82	99.75	99.67	99.60	99.53	99.46	99.40	99.32	99.25	99.18
766	99.69	99.62	99.54	99.47	99.40	99.33	99.27	99.19	99.12	99.05
765	99.56	99.49	99.41	99.34	99.27	99.20	99.14	99.06	98.99	98.92
764	99.43	99.36	99.28	99.21	99.14	99.07	99.01	98.93	98.86	98.79
763	99.30	99.23	99.15	99.08	99.01	98.94	98.88	98.80	98.73	98.66
762	99.17	99.10	99.02	98.95	98.88	98.81	98.75	98.67	98.60	98.53
761	99.04	98.97	98.89	98.82	98.75	98.68	98.62	98.54	98.47	98.40
760	98.91	98.84	98.76	98.69	98.62	98.55	98.49	98.41	98.34	98.27
759	98.78	98.71	98.63	98.57	98.49	98.42	98.36	98.28	98.21	98.14
758	98.65	98.58	98.50	98.44	98.36	98.29	98.23	98.15	98.08	98.01
757	98.52	98.45	98.37	98.31	98.23	98.16	98.10	98.02	97.95	97.88
756	98.39	98.32	98.24	98.18	98.10	98.03	97.97	97.89	97.82	97.75
755	98.26	98.19	98.11	98.05	97.97	97.90	97.84	97.76	97.69	97.62
754	98.13	98.06	97.98	97.92	97.84	97.77	97.71	97.63	97.56	97.49
753	98.00	97.93	97.85	97.79	97.71	97.64	97.58	97.50	97.43	97.36
752	97.87	97.80	97.72	97.66	97.58	97.51	97.45	97.37	97.30	97.23
751	97.74	97.67	97.59	97.53	97.45	97.38	97.32	97.24	97.17	97.10
750	97.61	97.54	97.46	97.40	97.32	97.25	97.19	97.11	97.04	96.97
749	97.48	97.41	97.33	97.27	97.20	97.12	97.05	96.98	96.91	96.84
748	97.35	97.28	97.20	97.14	97.07	96.99	96.92	96.85	96.78	96.71
747	97.22	97.15	97.07	97.01	96.94	96.86	96.79	96.72	96.65	96.58
746	97.09	97.02	96.94	96.88	96.81	96.73	96.66	96.59	96.52	96.45
745	96.96	96.89	96.81	96.75	96.68	96.61	96.54	96.47	96.40	96.33

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	5°	5.2°	5.4°	5.6°	5.8°	6°	6.2°	6.4°	6.6°	6.8°
775	100.13	100.06	99.98	99.91	99.84	99.77	99.70	99.63	99.56	99.49
774	100.00	99.93	99.85	99.78	99.71	99.65	99.58	99.51	99.44	99.37
773	99.87	99.80	99.72	99.65	99.58	99.52	99.45	99.38	99.31	99.24
772	99.75	99.68	99.60	99.53	99.46	99.39	99.32	99.25	99.18	99.11
771	99.62	99.55	99.47	99.40	99.33	99.26	99.19	99.12	99.05	98.98
770	99.49	99.42	99.34	99.27	99.20	99.13	99.06	98.99	98.92	98.85
769	99.36	99.29	99.21	99.14	99.07	99.00	98.93	98.86	98.79	98.72
768	99.23	99.16	99.08	99.01	98.94	98.87	98.80	98.73	98.66	98.59
767	99.10	99.03	98.95	98.88	98.81	98.74	98.67	98.60	98.53	98.46
766	98.97	98.90	98.82	98.75	98.68	98.62	98.55	98.48	98.41	98.34
765	98.84	98.77	98.69	98.62	98.55	98.49	98.42	98.35	98.28	98.21
764	98.71	98.64	98.56	98.49	98.42	98.36	98.29	98.22	98.15	98.08
763	98.58	98.51	98.43	98.36	98.29	98.23	98.16	98.09	98.02	97.95
762	98.45	98.38	98.30	98.23	98.16	98.10	98.03	97.96	97.89	97.82
761	98.33	98.26	98.18	98.11	98.04	97.97	97.90	97.83	97.76	97.69
760	98.20	98.13	98.05	97.98	97.91	97.84	97.77	97.70	97.63	97.56
759	98.07	98.00	97.93	97.87	97.80	97.71	97.64	97.57	97.50	97.43
758	97.94	97.87	97.80	97.74	97.67	97.59	97.52	97.45	97.38	97.31
757	97.81	97.74	97.67	97.61	97.54	97.46	97.39	97.32	97.25	97.18
756	97.68	97.61	97.54	97.48	97.41	97.33	97.26	97.19	97.12	97.05
755	97.55	97.48	97.41	97.35	97.28	97.20	97.13	97.06	96.99	96.92
754	97.42	97.35	97.28	97.22	97.15	97.07	97.00	96.93	96.86	96.79
753	97.29	97.22	97.15	97.09	97.02	96.94	96.87	96.80	96.73	96.66
752	97.16	97.09	97.02	96.96	96.89	96.81	96.74	96.67	96.60	96.53
751	97.03	96.96	96.89	96.83	96.76	96.68	96.61	96.54	96.47	96.40
750	96.90	96.83	96.76	96.70	96.63	96.56	96.49	96.42	96.35	96.28
749	96.78	96.71	96.64	96.57	96.50	96.43	96.38	96.30	96.23	96.16
748	96.65	96.58	96.51	96.44	96.37	96.30	96.25	96.17	96.10	96.03
747	96.52	96.45	96.38	96.31	96.24	96.17	96.12	96.04	95.97	95.90
746	96.39	96.32	96.25	96.18	96.11	96.04	95.99	95.91	95.84	95.77
745	96.26	96.19	96.12	96.05	95.98	95.91	95.86	95.78	95.71	95.64

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	7°	7.2°	7.4°	7.6°	7.8°	8°	8.2°	8.4°	8.6°	8.8°
775	99.42	99.35	99.28	99.21	99.14	99.06	98.99	98.93	98.86	98.79
774	99.29	99.22	99.15	99.08	99.01	98.94	98.87	98.81	98.74	98.67
773	99.16	99.09	99.02	98.95	98.88	98.81	98.74	98.68	98.61	98.54
772	99.03	98.96	98.89	98.82	98.75	98.68	98.61	98.55	98.48	98.41
771	98.91	98.84	98.77	98.70	98.63	98.55	98.48	98.42	98.35	98.28
770	98.78	98.71	98.64	98.57	98.50	98.42	98.35	98.29	98.22	98.15
769	98.65	98.58	98.51	98.45	98.38	98.30	98.23	98.16	98.09	98.02
768	98.52	98.45	98.38	98.32	98.25	98.17	98.10	98.03	97.96	97.89
767	98.39	98.32	98.25	98.19	98.12	98.04	97.97	97.90	97.83	97.76
766	98.26	98.19	98.12	98.06	97.99	97.91	97.84	97.77	97.70	97.63
765	98.14	98.07	98.00	97.94	97.87	97.79	97.72	97.65	97.58	97.51
764	98.01	97.94	97.87	97.81	97.64	97.66	97.59	97.52	97.45	97.38
763	97.88	97.81	97.74	97.68	97.61	97.53	97.56	97.49	97.42	97.35
762	97.75	97.68	97.61	97.55	97.48	97.40	97.33	97.26	97.19	97.12
761	97.62	97.55	97.48	97.42	97.35	97.27	97.20	97.13	97.06	96.99
760	97.49	97.42	97.35	97.29	97.22	97.15	97.08	97.01	96.94	96.87
759	97.37	97.30	97.23	97.17	97.10	97.02	96.95	96.88	96.81	96.75
758	97.24	97.17	97.10	97.04	96.97	96.89	96.82	96.75	96.68	96.62
757	97.11	97.04	96.97	96.91	96.84	96.76	96.69	96.62	96.55	96.49
756	96.98	96.91	96.84	96.78	96.71	96.64	96.57	96.50	96.43	96.37
755	96.85	96.78	96.71	96.65	96.58	96.51	96.44	96.37	96.30	96.24
754	96.72	96.65	96.58	96.52	96.45	96.38	96.31	96.24	96.17	96.11
753	96.60	96.53	96.46	96.40	96.33	96.25	96.18	96.11	96.04	95.98
752	96.47	96.40	96.33	96.27	96.20	96.12	96.05	95.98	95.91	95.85
751	96.34	96.27	96.20	96.14	96.07	96.00	95.93	95.86	95.79	95.73
750	96.21	96.14	96.07	96.01	95.94	95.87	95.80	95.73	95.66	95.60
749	96.08	96.01	95.94	95.88	95.81	95.74	95.67	95.60	95.54	95.47
748	95.96	95.89	95.82	95.76	95.69	95.61	95.54	95.47	95.41	95.34
747	95.83	95.76	95.69	95.63	95.56	95.49	95.42	95.35	95.29	95.22
746	95.70	95.63	95.56	95.50	95.43	95.36	95.29	95.22	95.16	95.09
745	95.57	95.50	95.43	95.37	95.30	95.23	95.16	95.09	95.03	94.96

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, ° C.									
	9°	9.2°	9.4°	9.6°	9.8°	10°	10.2°	10.4°	10.6°	10.8°
775	98.72	98.65	98.58	98.51	98.44	98.37	98.30	98.23	98.16	98.09
774	98.59	98.52	98.45	98.38	98.31	98.24	98.18	98.11	98.04	97.97
773	98.47	98.40	98.33	98.26	98.19	98.12	98.05	97.98	97.91	97.84
772	98.34	98.27	98.20	98.13	98.06	97.99	97.93	97.86	97.79	97.72
771	98.21	98.15	98.08	98.01	97.94	97.87	97.80	97.73	97.66	97.59
770	98.09	98.02	97.95	97.88	97.81	97.74	97.67	97.60	97.53	97.46
769	97.96	97.89	97.82	97.75	97.68	97.61	97.54	97.47	97.40	97.33
768	97.83	97.76	97.69	97.62	97.55	97.48	97.42	97.35	97.28	97.21
767	97.70	97.64	97.57	97.50	97.43	97.36	97.29	97.22	97.15	97.08
766	97.58	97.51	97.44	97.37	97.30	97.23	97.17	97.10	97.03	96.96
765	97.45	97.38	97.31	97.24	97.17	97.10	97.04	96.97	96.90	96.83
764	97.32	97.25	97.18	97.11	97.04	96.97	96.91	96.84	96.77	96.70
763	97.19	97.13	97.06	96.99	96.92	96.85	96.78	96.71	96.64	96.57
762	97.07	97.00	96.93	96.86	96.79	96.72	96.66	96.59	96.52	96.45
761	96.94	96.87	96.80	96.73	96.66	96.59	96.52	96.46	96.39	96.32
760	96.81	96.75	96.68	96.61	96.54	96.47	96.40	96.34	96.27	96.20
759	96.68	96.62	96.55	96.48	96.41	96.34	96.28	96.21	96.14	96.07
758	96.56	96.49	96.42	96.35	96.28	96.21	96.15	96.08	96.01	95.94
757	96.43	96.37	96.30	96.23	96.16	96.09	96.02	95.95	95.88	95.81
756	96.30	96.24	96.17	96.10	96.03	95.96	95.90	95.83	95.76	95.69
755	96.17	96.11	96.04	95.97	95.90	95.83	95.77	95.70	95.63	95.56
754	96.05	95.99	95.92	95.85	95.77	95.70	95.64	95.58	95.51	95.44
753	95.92	95.86	95.79	95.72	95.65	95.58	95.52	95.45	95.38	95.31
752	95.79	95.73	95.66	95.59	95.52	95.45	95.39	95.33	95.26	95.19
751	95.66	95.60	95.54	95.47	95.40	95.33	95.27	95.20	95.13	95.06
750	95.54	95.48	95.41	95.34	95.27	95.20	95.14	95.07	95.00	94.93
749	95.41	95.35	95.28	95.21	95.14	95.07	95.01	94.94	94.87	94.80
748	95.28	95.22	95.15	95.08	95.01	94.94	94.88	94.82	94.75	94.68
747	95.15	95.09	95.03	94.96	94.89	94.82	94.76	94.69	94.62	94.55
746	95.03	94.97	94.90	94.83	94.76	94.69	94.64	94.57	94.50	94.43
745	94.90	94.84	94.78	94.71	94.64	94.57	94.51	94.44	94.37	94.30

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	11°	11.2°	11.4°	11.6°	11.8°	**12°**	12.2°	12.4°	12.6°	12.8°
775	98.02	97.96	97.80	97.82	97.75	97.68	97.61	97.53	97.46	97.40
774	97.90	97.83	97.76	97.69	97.62	97.55	97.49	97.42	97.35	97.28
773	97.77	97.70	97.63	97.56	97.40	97.42	97.36	97.29	97.22	97.15
772	97.65	97.58	97.51	97.44	97.37	97.30	97.24	97.17	97.10	97.03
771	97.52	97.45	97.38	97.31	97.24	97.17	97.11	97.04	96.97	96.90
770	97.40	97.33	97.26	97.19	97.12	97.05	96.99	96.92	96.85	96.78
769	97.26	97.20	97.13	97.06	96.99	96.92	96.85	96.78	96.72	96.65
768	97.14	97.07	97.00	96.93	96.87	96.80	96.73	96.66	96.60	96.53
767	97.01	96.95	96.88	96.81	96.74	96.67	96.61	96.54	96.47	96.40
766	96.89	96.83	96.76	96.69	96.62	96.55	96.49	96.42	96.35	96.28
765	96.76	96.70	96.63	96.56	96.49	96.42	96.36	96.29	96.22	96.15
764	96.63	96.57	96.50	96.43	96.30	96.29	96.22	96.15	96.08	96.02
763	96.50	96.44	96.57	96.30	96.23	96.16	96.09	96.02	95.95	95.88
762	96.38	96.32	96.25	96.18	96.11	96.04	95.97	95.90	95.83	95.76
761	96.25	96.19	96.12	96.05	95.98	95.91	95.84	95.77	95.71	95.64
760	96.13	96.07	96.00	95.93	95.86	95.79	95.72	95.65	95.58	95.52
759	96.00	95.94	95.87	95.80	95.73	95.66	95.60	95.53	95.46	95.39
758	95.87	95.82	95.75	95.68	95.61	95.54	95.48	95.41	95.34	95.27
757	95.74	95.68	95.62	95.55	95.48	95.41	95.35	95.28	95.21	95.14
756	95.62	95.56	95.50	95.43	95.36	95.29	95.22	95.15	95.08	95.01
755	95.49	95.43	95.37	95.30	95.23	95.16	95.09	95.02	94.95	94.88
754	95.37	95.31	95.27	95.17	95.10	95.03	94 96	94.89	94.82	94.76
753	95.24	95.18	95.11	95.04	94.97	94.90	94.83	94.76	94.69	94.63
752	95.12	95.05	94.98	94.91	94.84	94.78	94.71	94.64	94.57	94.51
751	94.99	94.92	94.85	94.78	94.72	94.65	94.58	94.51	94.44	94.38
750	94.86	94.80	94.73	94.66	94.60	94.53	94.46	94.39	94.32	94.26
749	94.73	94.67	94.61	94.54	94.47	94.40	94.33	94.26	94.19	94.13
748	94.61	94.55	94.49	94.42	94.35	94.28	94.21	94.14	94.07	94.01
747	94.48	94.42	94.36	94.29	94.22	94.15	94.08	94.01	93.94	93.88
746	94.36	94.30	94.23	94.16	94.09	94.02	93.95	93.89	93.82	93.76
745	94.23	94.17	94.10	94.03	93.96	93.89	93.82	93.76	93.69	93.63

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	13°	13.2°	13.4°	13.6°	13.8°	**14°**	14.2°	14.4°	14.6°	14.8°
775	97.33	97.26	97.19	97.12	**97.06**	96.99	96.92	96.85	96.78	96.71
774	97.21	97.14	97.07	97.00	96.94	96.87	96.80	96.73	96.66	96.59
773	97.08	97.02	96.95	96.88	96.82	96.75	96.68	96.61	96.54	96.47
772	96.96	96.90	96.83	96.76	96.69	96.62	96.55	96.48	96.41	96.34
771	96.83	96.77	96.71	96.64	96.57	96.50	96.43	96.36	96.29	96.22
770	96.71	96.65	96.58	96.51	96.44	96.37	96.30	96.23	96.16	96.09
769	96.58	96.52	96.46	96.39	96.32	96.25	96.18	96.11	96.04	95.97
768	96.46	96.40	96.33	96.26	96.19	96.12	96.05	95.98	95.91	95.84
767	96.33	96.27	96.21	96.14	96.07	96.00	95.93	95.86	95.79	95.72
766	96.21	96.15	96.08	96.01	95.94	95.87	95.80	95.73	95.66	95.59
765	96.08	96.02	95.96	95.89	95.82	95.75	95.68	95.61	95.54	95.47
764	95.95	95.89	95.83	95.76	95.69	95.62	95.55	95.48	95.41	95.34
763	95.82	95.76	95.70	95.63	95.56	95.50	95.43	95.36	95.29	95.22
762	95.70	95.64	95.58	95.51	95.44	95.37	95.30	95.23	95.16	95.09
761	95.57	95.51	95.46	95.39	95.32	95.25	95.18	95.11	95.04	94.97
760	95.45	95.38	95.32	95.25	95.19	95.12	95.05	94.98	94.91	94.84
759	95.32	95.26	95.20	95.13	95.06	95.00	94.93	94.86	94.79	94.72
758	95.20	95.14	95.07	95.00	94.93	94.87	94.80	94.73	94.66	94.59
757	95.07	95.01	94.94	94.87	94.81	94.75	94.68	94.61	94.54	94.47
756	94.95	94.88	94.81	94.74	94.68	94.62	94.55	94.48	94.41	94.35
755	94.82	94.75	94.68	94.62	94.56	94.49	94.42	94.36	94.29	94.22
754	94.70	94.63	94.56	94.49	94.43	94.36	94.30	94.23	94.16	94.10
753	94.57	94.50	94.43	94.37	94.31	94.24	94.17	94.11	94.04	93.97
752	94.45	94.38	94.31	94.24	94.18	94.11	94.04	93.98	93.91	93.85
751	94.32	94.25	94.19	94.12	94.06	93.99	93.92	93.86	93.97	93.72
750	94.20	94.13	94.05	93.99	93.93	93.86	93.79	93.73	93.66	93.60
749	94.07	94.00	93.93	93.86	93.80	93.74	93.67	93.61	93.54	93.47
748	93.95	93.88	93.81	93.74	93.68	93.61	93.55	93.48	93.41	93.35
747	93.82	93.75	93.68	93.62	93.56	93.49	93.43	93.36	93.29	93.22
746	93.70	93.63	93.56	93.49	93.43	93.36	93.30	93.23	93.16	93.10
745	93.57	93.50	93.44	93.37	93.31	94.24	93.18	93.11	93.04	92.97

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	15°	15.2°	15.4°	15.6°	15.8°	16°	16.2°	16.4°	16.6°	16.8°
775	96.65	96.58	96.51	96.45	96.38	96.32	96.25	96.19	96.13	96.07
774	96.53	96.47	96.40	96.33	96.26	96.20	96.13	96.06	96.00	95.93
773	96.41	96.35	96.28	96.21	96.14	96.07	96.00	95.94	95.88	95.81
772	96.28	96.22	96.16	96.09	96.02	95.95	95.88	95.82	95.76	95.69
771	96.16	96.10	96.04	95.97	95.90	95.82	95.76	95.70	95.64	95.57
770	96.03	95.98	95.92	95.85	95.78	95.72	95.64	95.58	95.52	95.45
769	95.91	95.85	95.78	95.71	95.64	95.57	95.51	95.46	95.40	95.33
768	95.78	95.72	95.65	95.59	95.52	95.45	95.40	95.34	95.28	95.20
767	95.66	95.60	95.54	95.47	94.40	95.33	95.26	95.20	95.13	95.07
766	95.53	95.47	95.41	95.34	95.27	95.20	95.14	95.08	95.02	94.95
765	95.41	95.34	95.28	95.21	95.15	95.08	95.01	94.94	94.88	94.82
764	95.28	95.22	95.15	95.08	95.02	94.95	94.89	94.82	94.76	94.70
763	95.16	95.10	95.03	94.96	94.90	94.83	94.77	94.70	94.64	94.58
762	95.03	94.97	94.91	94.84	94.77	94.70	94.65	94.58	94.52	94.46
761	94.91	94.85	94.79	94.72	94.65	94.58	94.52	94.46	94.40	94.34
760	94.78	94.72	94.66	94.60	94.53	94.46	94.40	94.34	94.28	94.22
759	94.66	94.60	94.54	94.47	94.40	94.33	94.28	94.22	94.16	94.10
758	94.53	94.47	94.42	94.35	94.28	94.21	94.16	94.10	94.04	93.98
757	94.41	94.35	94.28	94.20	94.14	94.08	94.02	93.98	93.92	93.86
756	94.29	94.23	94.16	94.09	94.03	93.96	93.90	93.83	93.76	93.69
755	94.16	94.10	94.03	93.96	93.89	93.83	93.77	93.71	93.64	93.57
754	94.04	93.97	93.90	93.84	93.77	93.71	93.64	93.56	93.50	93.44
753	93.91	93.85	93.78	93.72	93.65	93.59	93.51	93.44	93.38	93.32
752	93.79	93.73	93.66	93.60	93.53	93.46	93.40	93.34	93.28	93.21
751	93.66	93.60	93.54	93.49	93.41	93.34	93.28	93.22	93.16	93.09
750	93.54	93.48	93.42	93.36	93.28	93.21	93.15	93.09	93.03	92.96
749	93.41	93.35	93.30	93.23	93.16	93.09	93.03	92.97	92.91	92.84
748	93.29	93.23	93.16	93.09	93.03	92.96	92.91	92.85	92.79	92.72
747	93.16	93.10	93.03	92.97	92.91	92.84	92.78	92.72	92.66	92.60
746	93.04	92.98	92.91	92.85	92.79	92.72	92.66	92.60	92.54	94.48
745	92.91	92.86	92.79	92.73	92.66	92.59	92.54	92.48	92.42	92.36

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at } 0^\circ \text{ C. and } 760 \text{ mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	17°	17.2°	17.4°	17.6°	17.8°	18°	18.2°	18.4°	18.6°	18.8°
775	96.01	95.94	95.86	95.79	95.72	95.66	95.59	95.53	95.46	95.40
774	95.86	95.80	95.73	95.66	95.60	95.54	95.47	95.41	95.34	95.28
773	95.74	95.68	95.62	95.55	95.48	95.41	95.35	95.29	95.22	95.16
772	95.62	95.56	95.50	95.43	95.36	95.29	95.23	95.17	95.10	95.04
771	95.50	95.44	95.38	95.31	95.24	95.16	95.10	95.05	94.98	94.91
770	95.38	95.32	95.26	95.18	95.11	95.04	94.98	94.91	94.85	94.78
769	95.26	95.20	95.13	95.05	94.98	94.92	94.86	94.79	94.73	94.66
768	95.14	95.08	95.00	94.92	94.85	94.79	94.73	94.66	94.60	94.54
767	95.00	94.93	94.86	94.80	94.73	94.67	94.61	94.54	94.48	94.42
766	94.88	94.81	94.74	94.68	94.61	94.55	94.49	94.42	94.36	94.30
765	94.75	94.68	94.62	94.56	94.49	94.42	94.37	94.30	94.24	94.18
764	94.63	94.56	94.50	94.44	94.37	94.30	94.24	94.18	94.12	94.06
763	94.51	94.44	94.38	94.32	94.25	94.18	94.12	94.06	94.00	93.94
762	94.39	94.32	94.26	94.19	94.12	94.05	94.00	93.94	93.88	93.82
761	94.27	94.20	94.14	94.07	94.00	93.93	93.88	93.82	93.76	93.69
760	94.15	94.08	94.02	93.95	93.88	93.81	93.74	93.67	93.61	93.55
759	94.03	93.96	93.90	93.82	93.75	93.68	93.62	93.55	93.49	93.43
758	93.91	93.84	93.77	93.70	93.63	93.56	93.50	93.43	93.37	93.31
757	93.79	93.71	93.64	93.57	93.51	93.44	93.38	93.31	93.25	93.19
756	93.62	93.56	93.50	93.44	93.38	93.31	93.25	93.19	93.12	93.06
755	93.50	93.44	93.38	93.32	93.26	93.19	93.13	93.07	93.00	92.94
754	93.38	93.32	93.26	93.20	93.14	93.07	93.00	92.94	92.88	92.82
753	93.26	93.20	93.14	93.08	93.01	92.94	92.88	92.82	92.76	92.70
752	93.15	93.08	93.02	92.96	92.89	92.82	92.76	92.70	92.64	92.58
751	93.03	92.96	92.90	92.84	92.77	92.70	92.64	92.58	92.52	92.46
750	92.90	92.83	92.77	92.71	92.64	92.57	92.51	92.46	92.40	92.33
749	92.78	92.71	92.65	92.58	92.52	92.45	92.38	92.32	92.26	92.20
748	92.66	92.59	92.53	92.46	92.40	92.33	92.26	92.20	92.14	92.08
747	92.54	92.47	92.40	92.34	92.27	92.20	92.14	92.08	92.02	91.95
746	92.42	92.35	92.28	92.22	92.15	92.08	92.02	91.96	91.90	91.83
745	92.30	92.23	92.16	92.10	92.03	91.96	91.90	91.84	91.78	91.71

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	19.2	19.2°	19.4°	19.6°	19.8°	**20°**	20.2°	**20.4°**	**20.6°**	**20.8°**
775	95.33	95.27	95.20	95.14	95.08	95.01	94.95	94.88	94.81	94.75
774	95.21	95.14	95.08	95.02	94.95	94.88	94.81	94.74	94.68	94.62
773	95.09	95.02	94.96	94.90	94.83	94.76	94.69	94.62	94.56	94.50
772	94.97	94.91	94.85	94.78	94.71	94.64	94.57	94.50	94.44	94.38
771	94.86	94.80	94.73	94.66	94.59	94.52	94.45	94.38	94.32	94.26
770	94.71	94.65	94.58	94.52	94.46	94.39	94.33	94.26	94.20	94.14
769	94.59	94.53	94.46	94.40	94.34	94.27	94.20	94.14	94.08	94.01
768	94.47	94.41	94.34	94.28	94.22	94.15	94.08	94.02	93.96	93.89
767	94.35	94.29	94.21	94.15	94.09	94.02	93.96	93.90	93.83	93.77
766	94.23	94.17	94.09	94.03	93.97	93.90	93.84	93.78	93.71	93.64
765	94.11	94.04	93.97	93.91	93.85	93.78	93.72	93.66	93.59	93.62
764	93.99	93.92	93.85	93.79	93.73	93.66	93.60	93.54	93.47	93.40
763	93.87	93.80	93.73	93.67	93.60	93.53	93.48	93.42	93.35	93.28
762	93.75	93.68	93.61	93.55	93.48	93.41	93.35	93.29	93.23	93.16
761	93.62	93.55	93.48	93.42	93.35	93.29	93.23	93.17	93.10	93.03
760	93.49	93.42	93.36	93.29	93.23	93.17	93.11	93.05	92.98	92.91
759	93.36	93.30	93.24	93.17	93.11	93.04	92.99	92.93	92.86	92.79
758	93.24	93.18	93.12	93.05	92.99	92.92	92.86	92.81	92.74	92.67
757	93.12	93.06	93.00	92.93	92.87	92.80	92.74	92.68	92.62	92.55
756	93.00	92.94	92.88	92.81	92.75	92.68	92.61	92.55	92.49	92.42
755	92.88	92.82	92.76	92.69	92.62	92.55	92.49	92.43	92.36	92.30
754	92.76	92.70	92.64	92.57	92.50	92.43	92.36	92.30	92.24	92.18
753	92.64	92.58	92.52	92.45	92.38	92.31	92.24	92.18	92.12	92.06
752	92.52	92.46	92.39	92.32	92.26	92.19	92.12	92.06	92.00	91.93
751	92.40	92.33	92.26	92.19	92.12	92.06	92.00	91.93	91.88	91.81
750	92.26	92.19	92.12	92.06	92.00	91.94	91.88	91.82	91.76	91.69
749	92.13	92.07	92.01	91.94	91.88	91.82	91.76	91.70	91.64	91.57
748	92.01	91.95	91.88	91.82	91.76	91.70	91.64	91.58	91.52	91.45
747	91.89	91.83	91.76	91.70	91.64	91.57	91.51	91.45	91.39	91.32
746	91.77	91.71	91.64	91.59	91.52	91.45	91.39	91.33	91.27	91.20
745	91.65	91.59	91.53	91.47	91.40	91.33	91.27	91.21	91.15	91.08

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	21°	21.2°	21.4°	21.6°	21.8°	22°	22.2°	22.4°	22.6°	22.8°
775	94.68	94.61	94.54	94.48	94.42	94.36	94.29	94 22	94.16	94.10
774	94.56	94.49	94.42	94.36	94.30	94.24	94.17	94.10	94.04	93.98
773	94.44	94.37	94.30	94.24	94.18	94.12	94.05	93.98	93.92	93.86
772	94.31	94.24	94.17	94.11	94.05	93.99	93.92	93.86	93.80	93.74
771	94.19	94.12	94.05	93.99	93.93	93.87	93.80	93.73	93.67	93.61
770	94.07	94.00	93.93	93.87	93.81	93.75	93.68	93.61	93.55	93.49
769	93.95	93.88	93.81	93.75	93.69	93.63	93.56	93.49	93.43	93.37
768	93.83	93.76	93.69	93.63	93.57	93.51	93.44	93.37	93.31	93.25
767	93.70	93.63	93.57	93.51	93.45	93.39	93.32	93.25	93.19	93.13
766	93.58	93.51	93.44	93.38	93.32	93.26	93.19	93.13	93.07	93.01
765	93.46	93.39	93.32	93.26	93.20	93.14	93.07	93.01	92.95	92.89
764	93.34	93.27	93.20	93.14	93.08	93.02	92.95	92.89	92.83	92.77
763	93.22	93.15	93.08	93.02	92.96	92.90	92.83	92.77	92.71	92.65
762	93.10	93.03	92.96	92.90	92.84	92.78	92.71	92.64	92.58	92.52
761	92.98	92.91	92.84	92.77	92.71	92.65	92.58	92.52	92.46	92.40
760	92.86	92.79	92.72	92.65	92.59	92.53	92.46	92.40	92.34	92.28
759	92.74	92.67	92.60	92.53	92.74	92.41	92.34	92.28	92.22	92.16
758	92.62	92.55	92.48	92.41	92.35	92.29	92.22	92.16	92.10	92.04
757	92.49	92.42	92.35	92.29	92.23	92.17	92.10	92.04	91.98	91.92
756	92.37	92.30	92.23	92.17	92.11	92.05	91.98	91.92	91.86	91.80
755	92.25	92.18	92.11	92.05	91.99	91.93	91.86	91.80	91.74	91.68
754	92.13	92.06	91.99	91.92	91.86	91.80	91.74	91.68	91.62	91.56
753	92.01	91.94	91.87	91.80	91.74	91.68	91.62	91.56	91.50	91.44
752	91.88	91.81	91.74	91.68	91.62	91.56	91.49	91.43	91.37	91.31
751	91.75	91.68	91.62	91.56	91.50	91.44	91.37	91.31	91.25	91.19
750	91.63	91.56	91.50	91.44	91.38	91.32	91.25	91.19	91.13	91.07
749	91.50	91.43	91.37	91.31	91.25	91.19	91.13	91.07	91.01	90.95
748	91.38	91.31	91.25	91.19	91.13	91.07	91.01	90.95	90.89	90.83
747	91.26	91.19	91.13	91.07	91.01	90.95	90.89	90.83	90.77	90.71
746	91.14	91.07	91.01	90.95	90.89	90.83	90.77	90.71	90.65	90.59
745	91.02	90.95	90.89	90.83	90.77	90.71	90.65	90.59	90.53	90.47

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	23°	23.2°	23.4°	23.6°	23.8°	**24°**	24.2°	24.4°	24.6°	24.8°
775	**94.04**	93.97	93.91	93.85	93.79	93.72	93.65	93.59	93.53	93.47
774	93.92	93.85	93.79	93.73	93.67	93.60	93.53	93.47	93.41	93.35
773	93.80	93.73	93.67	93.61	93.55	93.48	93.41	93.35	93.29	93.23
772	93.68	93.61	93.55	93.49	93.43	93.36	93.29	93.23	93.17	93.11
771	93.55	93.48	93.42	93.36	93.30	93.23	93.17	93.11	93.05	92.99
770	93.43	93.36	93.30	93.24	93.18	93.11	93.05	92.99	92.93	92.87
769	93.31	93.24	93.18	93.12	93.06	92.99	92.93	92.87	92.81	92.75
768	93.19	93.12	93.06	93.00	92.94	92.87	92.81	92.75	92.69	92.63
767	93.07	93.00	92.94	92.88	92.82	92.75	92.69	92.63	92.57	92.51
766	92.95	92.88	92.82	92.76	92.70	92.63	92.57	92.51	92.45	92.39
765	92.83	92.76	92.70	92.64	92.58	92.51	92.45	92.39	92.33	92.27
764	92.71	92.64	92.58	92.52	92.46	92.39	92.33	92.27	92.21	92.15
763	92.59	92.52	92.46	92.40	92.34	92.27	92.20	92.14	92.08	92.02
762	92.46	92.39	92.33	92.27	92.21	92.14	92.08	92.02	91.96	91.90
761	92.34	92.27	92.21	92.15	92.09	92.02	91.96	91.90	91.84	91.78
760	92.22	92.15	92.09	92.03	91.97	91.90	91.84	91.78	91.72	91.66
759	92.10	92.03	91.97	91.91	91.85	91.78	91.72	91.66	91.60	91.54
758	91.98	91.91	91.85	91.79	91.73	91.66	91.60	91.54	91.48	91.42
757	91.86	91.79	91.73	91.67	91.61	91.54	91.48	91.42	91.36	91.30
756	91.74	91.67	91.61	91.55	91.49	91.42	91.36	91.30	91.24	91.18
755	91.62	91.55	91.49	91.43	91.37	91.30	91.24	91.18	91.12	91.06
754	91.50	91.43	91.37	91.31	91.25	91.18	91.12	91.06	91.00	90.94
753	91.38	91.31	91.25	91.19	91.13	91.06	91.00	90.94	90.88	90.82
752	91.25	91.18	91.12	91.06	91.00	90.94	90.88	90.82	90.76	90.70
751	91.13	91.06	91.00	90.94	90.88	90.82	90.76	90.70	90.64	90.58
750	91.01	90.94	90.88	90.82	90.76	90.70	90.64	90.58	90.52	90.46
749	90.89	90.82	90.76	90.70	90.64	90.58	90.52	90.46	90.40	90.34
748	90.77	90.70	90.64	90.58	90.52	90.46	90.40	90.34	90.28	90.22
747	90.65	90.58	90.52	90.46	90.40	90.33	90.27	90.21	90.15	90.09
746	90.53	90.46	90.40	90.34	90.28	90.21	90.15	90.09	90.03	89.97
745	90.41	90.34	90.28	90.22	90.16	90.09	90.03	89.97	89.91	89.85

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, °C.									
	25°	25.2°	25.4°	25.6°	25.8°	**26°**	26.2°	26.4°	26.6°	26.8°
775	93.40	93.34	93.28	93.22	93.16	93.10	93.04	92.98	92.92	92.85
774	93.28	93.22	93.16	93.10	93.04	92.98	92.92	92.86	92.80	92.73
773	93.16	93.10	93.04	92.98	92.92	92.86	92.80	92.74	92.68	92.61
772	93.04	92.98	92.92	92.86	92.80	92.74	92.68	92.62	92.56	92.49
771	92.92	92.86	92.80	92.74	92.68	92.62	92.56	92.50	92.44	92.37
770	92.80	92.74	92.68	92.62	92.56	92.50	92.44	92.38	92.32	92.25
769	92.68	92.62	92.56	92.50	92.44	92.38	92.32	92.26	92.20	92.13
768	92.56	92.50	92.44	92.38	92.32	92.26	92.20	92.14	92.08	92.02
767	92.44	92.38	92.32	92.26	92.20	92.14	92.08	92.02	91.96	91.90
766	92.32	92.26	92.20	92.14	92.08	92.02	91.96	91.90	91.84	91.78
765	92.20	92.14	92.08	92.02	91.96	91.90	91.84	91.78	91.72	91.66
764	92.08	92.02	91.96	91.90	91.84	91.78	91.72	91.66	91.60	91.54
763	91.96	91.90	91.84	91.78	91.72	91.66	91.60	91.54	91.48	91.42
762	91.84	91.78	91.72	91.66	91.60	91.54	91.48	91.42	91.36	91.30
761	91.72	91.66	91.60	91.54	91.48	91.42	91.36	91.30	91.24	91.18
760	91.60	91.54	91.48	91.42	91.36	91.30	91.24	91.18	91.12	91.06
759	91.48	91.42	91.36	91.30	91.24	91.18	91.12	91.06	91.00	90.94
758	91.36	91.30	91.24	91.18	91.12	91.06	91.00	90.94	90.88	90.82
757	91.24	91.18	91.12	91.06	91.00	90.94	90.88	90.82	90.76	90.70
756	91.12	91.06	91.00	90.94	90.88	90.82	90.76	90.70	90.64	90.58
755	91.00	90.94	90.88	90.82	90.76	90.70	90.64	90.58	90.52	90.46
754	90.88	90.82	90.76	90.70	90.64	90.58	90.52	90.46	90.40	90.34
753	90.76	90.70	90.64	90.58	90.52	90.46	90.40	90.34	90.28	90.22
752	90.64	90.58	90.52	90.46	90.40	90.34	90.28	90.22	90.16	90.10
751	90.51	90.45	90.39	90.33	90.27	90.22	90.16	90.10	90.04	89.98
750	90.39	90.33	90.27	90.21	90.16	90.10	90.04	89.98	89.92	89.86
749	90.27	90.21	90.15	90.09	90.03	89.98	89.92	89.86	89.80	89.74
748	90.15	90.09	90.03	89.97	89.91	89.86	89.80	89.74	89.68	89.62
747	90.03	89.97	89.91	89.85	89.79	89.74	89.68	89.62	89.56	89.50
746	89.91	89.85	89.79	89.73	89.67	89.62	89.56	89.50	89.44	89.38
745	89.79	89.73	89.67	89.61	89.55	89.50	89.44	89.38	89.32	89.26

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TABLE 2.—*Correction factors for reducing volume of nitric oxide (NO) in cubic centimeters observed on Lunge nitrometer to volume in cubic centimeters at 0° C. and 760 mm. pressure*—Continued.

$$\left[\frac{\text{c. c. in nitrometer} \times \text{factor}}{100} = \text{number of c. c. at 0° C. and 760 mm. pressure.}\right]$$

Barometric pressure, mm. of mercury.	Temperature, ° C.									
	27°	27.2°	27.4°	27.6°	27.8°	**28°**	28.2°	28.4°	28.6°	28.8°
775	92.79	92.72	92.66	92.60	92.54	92.48	92.42	92.36	92.30	92.24
774	92.67	92.60	92.54	92.48	92.42	92.36	92.30	92.24	92.18	92.12
773	92.55	92.48	92.42	92.36	92.30	92.24	92.18	92.12	92.06	92.00
772	92.43	92.36	92.30	92.24	92.18	92.12	92.06	92.00	91.94	91.88
771	92.31	92.24	92.18	92.12	92.06	92.00	91.94	91.88	91.82	91.76
770	92.19	92.12	92.06	92.00	91.94	91.88	91.82	91.76	91.70	91.64
769	92.07	92.00	91.94	91.88	91.82	91.76	91.70	91.64	91.58	91.52
768	91.95	91.88	91.82	91.76	91.70	91.64	91.58	91.52	91.46	91.40
767	91.83	91.76	91.70	91.64	91.58	91.52	91.46	91.40	91.34	91.28
766	91.71	91.64	91.58	91.52	91.46	91.40	91.34	91.28	91.22	91.16
765	91.59	91.52	91.46	91.40	91.34	91.28	91.22	91.16	91.10	91.04
764	91.47	91.41	91.35	91.29	91.23	91.17	91.10	91.04	90.98	90.92
763	91.35	91.29	91.23	91.17	91.11	91.05	90.99	90.93	90.87	90.81
762	91.23	91.17	91.11	91.05	90.99	90.93	90.87	90.81	90.75	90.69
761	91.11	91.05	90.99	90.93	90.87	90.81	90.75	90.69	90.63	90.57
760	90.99	90.93	90.87	90.81	90.75	90.69	90.63	90.57	90.51	90.45
759	90.87	90.81	90.75	90.69	90.63	90.57	90.51	90.45	90.39	90.33
758	90.75	90.69	90.63	90.57	90.51	90.45	90.39	90.33	90.27	90.21
757	90.63	90.57	90.51	90.45	90.39	90.33	90.27	90.21	90.15	90.07
756	90.51	90.45	90.39	90.33	90.27	90.21	90.15	90.09	90.03	89.99
755	90.39	90.33	90.27	90.21	90.15	90.09	90.03	89.97	89.91	89.85
754	90.27	90.21	90.15	90.09	90.03	89.97	89.91	89.85	89.79	89.73
753	90.15	90.09	90.03	89.97	89.91	89.85	89.79	89.73	89.67	89.61
752	90.03	89.97	89.91	89.85	89.79	89.73	89.67	89.61	89.55	89.49
751	89.91	89.85	89.79	89.73	89.67	89.61	89.55	89.49	89.43	89.37
750	89.79	89.73	89.67	89.61	89.55	89.49	89.43	89.37	89.31	89.25
749	89.68	89.62	89.56	89.50	89.44	89.38	89.31	89.25	89.19	89.13
748	89.56	89.50	89.44	89.38	89.32	89.26	89.20	89.14	89.08	89.02
747	89.44	89.38	89.32	89.26	89.20	89.14	89.08	89.02	88.96	88.90
746	89.32	89.26	89.20	89.14	89.08	89.02	88.96	88.90	88.84	88.78
745	89.20	89.14	89.08	89.02	88.96	88.90	88.84	88.78	88.72	88.66

Barometric pressure, mm. of mercury.	Temperature, °C.						Barometric pressure, mm. of mercury.	Temperature, °C.					
	29°	29.2°	29.4°	29.6°	29.8°	**30°**		29°	29.2°	29.4°	29.6°	29.8°	**30°**
775	92.18	92.11	92.05	91.99	91.93	91.87	759	90.27	90.21	90.15	90.09	90.03	89.97
774	92.06	91.99	91.93	91.87	91.81	91.75	758	90.15	90.09	90.03	89.97	89.91	89.85
773	91.94	91.87	91.81	91.75	91.69	91.63	757	90.03	89.97	89.91	89.85	89.79	89.73
772	91.82	91.75	91.69	91.63	91.57	91.51	756	89.91	89.85	89.79	89.73	89.68	89.62
771	91.70	91.63	91.57	91.51	91.45	91.39	**755**	89.79	89.73	89.67	89.62	89.56	89.50
770	91.58	91.52	91.46	91.40	91.34	91.28	754	89.67	89.61	89.55	89.50	89.44	89.38
769	91.46	91.40	91.34	91.28	91.22	91.16	753	89.55	89.49	89.43	89.38	89.32	89.26
768	91.34	91.28	91.22	91.16	91.10	91.04	752	89.43	89.37	89.31	89.26	89.20	89.14
767	91.22	91.16	91.10	91.04	90.98	90.92	751	89.31	89.25	89.19	89.14	89.08	89.02
766	91.10	91.04	90.98	90.92	90.86	90.80	**750**	89.19	89.13	89.07	89.02	88.96	88.90
765	90.98	90.92	90.86	90.80	90.74	90.68	749	89.07	89.01	88.95	88.90	88.84	88.79
764	90.86	90.80	90.74	90.68	90.62	90.56	748	88.96	88.90	88.84	88.78	88.73	88.67
763	90.75	90.69	90.63	90.57	90.51	90.45	747	88.84	88.78	88.72	88.66	88.61	88.55
762	90.63	90.57	90.51	90.45	90.39	90.33	746	88.72	88.66	88.60	88.54	88.49	88.43
761	90.51	90.45	90.39	90.33	90.27	90.21	**745**	88.60	88.54	88.48	88.42	88.37	88.31
760	90.39	90.33	90.27	90.21	90.15	90.09							

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure.*

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	97	97.2	97.4	97.6	97.8	**98**	98.2	98.4	98.6	98.8
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600	10.13	10.15	10.17	10.20	10.22	10.24	10.26	10.28	10.30	10.32
598	10.17	10.19	10.21	10.23	10.25	10.27	10.29	10.31	10.33	10.35
596	10.20	10.22	10.24	10.27	10.29	10.31	10.33	10.35	10.37	10.39
594	10.23	10.25	10.27	10.30	10.32	10.34	10.36	10.38	10.40	10.42
592	10.27	10.29	10.31	10.34	10.36	10.38	10.40	10.42	10.44	10.46
590	10.30	10.32	10.34	10.37	10.39	10.41	10.43	10.45	10.47	10.49
588	10.34	10.36	10.38	10.41	10.43	10.45	10.47	10.49	10.51	10.53
586	10.37	10.39	10.41	10.44	10.46	10.48	10.50	10.52	10.54	10.56
584	10.41	10.43	10.45	10.48	10.50	10.52	10.54	10.56	10.58	10.60
582	10.45	10.47	10.49	10.52	10.54	10.56	10.58	10.60	10.62	10.64
580	10.48	10.50	10.52	10.55	10.57	10.59	10.61	10.63	10.65	10.67
578	10.52	10.54	10.56	10.59	10.61	10.63	10.65	10.67	10.69	10.71
576	10.55	10.57	10.59	10.62	10.64	10.67	10.69	10.71	10.73	10.75
574	10.59	10.61	10.63	10.66	10.68	10.70	10.72	10.74	10.76	10.78
572	10.63	10.65	10.67	10.70	10.72	10.74	10.76	10.78	10.80	10.82
570	10.67	10.69	10.71	10.74	10.76	10.78	10.80	10.82	10.84	10.86
568	10.70	10.72	10.74	10.77	10.79	10.82	10.84	10.86	10.88	10.90
566	10.74	10.76	10.78	10.81	10.83	10.86	10.88	10.90	10.92	10.94
564	10.78	10.80	10.82	10.85	10.87	10.89	10.91	10.93	10.95	10.97
562	10.82	10.84	10.86	10.88	10.90	10.92	10.94	10.96	10.98	11.00
560	10.86	10.88	10.90	10.93	10.95	10.97	10.99	11.01	11.03	11.05
558	10.89	10.91	10.93	10.96	10.98	11.01	11.03	11.05	11.07	11.09
556	10.93	10.95	10.97	11.00	11.02	11.05	11.07	11.09	11.11	11.13
554	10.97	10.99	11.01	11.04	11.06	11.09	11.11	11.13	11.15	11.17
552	11.01	11.03	11.05	11.08	11.10	11.13	11.15	11.17	11.19	11.21
550	11.05	11.07	11.09	11.12	11.14	11.17	11.19	11.21	11.23	11.25
548	11.09	11.11	11.13	11.16	11.18	11.21	11.23	11.25	11.27	11.29
546	11.13	11.15	11.17	11.20	11.22	11.25	11.27	11.29	11.31	11.33
544	11.18	11.20	11.22	11.25	11.27	11.30	11.32	11.34	11.36	11.38
542	11.22	11.24	11.26	11.29	11.31	11.34	11.36	11.38	11.40	11.42
540	11.26	11.28	11.30	11.33	11.35	11.38	11.40	11.42	11.44	11.46
538	11.30	11.32	11.34	11.37	11.39	11.42	11.44	11.46	11.48	11.50
536	11.34	11.36	11.38	11.41	11.43	11.46	11.48	11.51	11.53	11.55
534	11.38	11.40	11.42	11.45	11.47	11.50	11.52	11.55	11.57	11.59
532	11.43	11.45	11.47	11.50	11.52	11.55	11.57	11.59	11.62	11.64
530	11.47	11.49	11.51	11.54	11.56	11.59	11.61	11.64	11.66	11.69
528	11.51	11.53	11.55	11.58	11.61	11.64	11.66	11.68	11.70	11.73
526	11.56	11.58	11.60	11.63	11.65	11.68	11.70	11.72	11.74	11.77
524	11.60	11.62	11.64	11.67	11.70	11.73	11.75	11.77	11.79	11.82
522	11.65	11.67	11.69	11.72	11.74	11.77	11.79	11.81	11.83	11.86
520	11.69	11.71	11.73	11.77	11.79	11.82	11.84	11.86	11.89	11.91
518	11.74	11.76	11.78	11.81	11.83	11.86	11.88	11.91	11.93	11.96
516	11.78	11.80	11.82	11.85	11.87	11.90	11.92	11.95	11.97	11.99
514	11.83	11.85	11.87	11.90	11.92	11.95	11.97	12.00	12.02	12.04
512	11.87	11.89	11.91	11.94	11.96	11.99	12.02	12.05	12.07	12.09
510	11.92	11.94	11.96	11.99	12.01	12.04	12.06	12.09	12.11	12.13
508	11.97	11.99	12.01	12.04	12.06	12.09	12.12	12.14	12.16	12.18
506	12.01	12.03	12.05	12.08	12.10	12.13	12.16	12.19	12.21	12.23
504	12.06	12.08	12.10	12.13	12.15	12.18	12.21	12.24	12.26	12.28
502	12.11	12.13	12.15	12.18	12.20	12.23	12.26	12.29	12.31	12.33
500	12.16	12.18	12.20	12.23	12.25	12.28	12.30	12.33	12.35	12.37
498	12.21	12.23	12.25	12.28	12.30	12.33	12.35	12.38	12.40	12.42
496	12.26	12.28	12.30	12.33	12.35	12.38	12.40	12.43	12.45	12.47
494	12.31	12.33	12.35	12.38	12.40	12.43	12.45	12.48	12.50	12.52
492	12.36	12.38	12.40	12.43	12.45	12.48	12.51	12.54	12.56	12.58
490	12.41	12.43	12.45	12.48	12.50	12.53	12.56	12.59	12.61	12.63
488	12.46	12.48	12.50	12.53	12.55	12.58	12.61	12.64	12.66	12.68
486	12.51	12.53	12.55	12.58	12.60	12.63	12.66	12.69	12.71	12.73
484	12.56	12.58	12.60	12.63	12.65	12.68	12.71	12.74	12.76	12.78
482	12.61	12.63	12.65	12.68	12.71	12.74	12.77	12.80	12.82	12.84
480	12.67	12.69	12.71	12.74	12.76	12.79	12.82	12.85	12.87	12.89
478	12.72	12.74	12.76	12.79	12.81	12.84	12.87	12.90	12.92	12.94

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	99	99.2	99.4	99.6	99.8	100	100.2	100.4	100.6	100.8
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
600	10.35	10.37	10.39	10.41	10.43	10.45	10.47	10.49	10.51	10.53
598	10.38	10.40	10.42	10.44	10.46	10.48	10.50	10.52	10.54	10.56
596	10.42	10.44	10.46	10.48	10.50	10.52	10.54	10.56	10.58	10.60
594	10.45	10.47	10.49	10.51	10.53	10.55	10.57	10.60	10.62	10.64
592	10.49	10.51	10.53	10.55	10.57	10.59	10.61	10.63	10.65	10.67
590	10.52	10.54	10.56	10.58	10.60	10.62	10.64	10.66	10.68	10.70
588	10.56	10.58	10.60	10.62	10.64	10.66	10.69	10.71	10.73	10.75
586	10.59	10.61	10.63	10.65	10.67	10.69	10.72	10.74	10.76	10.78
584	10.63	10.65	10.67	10.69	10.71	10.73	10.75	10.77	10.79	10.81
582	10.67	10.69	10.71	10.73	10.75	10.77	10.79	10.81	10.83	10.85
580	10.70	10.72	10.74	10.77	10.79	10.81	10.83	10.85	10.87	10.89
578	10.74	10.76	10.78	10.81	10.83	10.85	10.87	10.89	10.91	10.93
576	10.78	10.80	10.82	10.84	10.86	10.88	10.90	10.92	10.94	10.96
574	10.81	10.83	10.85	10.88	10.90	10.92	10.94	10.96	10.98	11.00
572	10.85	10.87	10.89	10.92	10.94	10.96	10.98	11.00	11.03	11.06
570	10.89	10.91	10.93	10.96	10.98	11.00	11.02	11.04	11.06	11.08
568	10.93	10.95	10.97	10.99	11.01	11.03	11.06	11.09	11.11	11.13
566	10.97	10.99	11.01	11.03	11.05	11.07	11.10	11.13	11.16	11.18
564	11.00	11.02	11.04	11.07	11.09	11.11	11.14	11.16	11.19	11.22
562	11.03	11.05	11.08	11.11	11.13	11.15	11.17	11.20	11.23	11.25
560	11.08	11.10	11.12	11.15	11.17	11.19	11.22	11.24	11.26	11.28
558	11.12	11.14	11.16	11.19	11.21	11.23	11.26	11.28	11.30	11.32
556	11.16	11.18	11.20	11.23	11.25	11.27	11.30	11.32	11.34	11.37
554	11.20	11.22	11.24	11.27	11.29	11.31	11.34	11.36	11.38	11.40
552	11.24	11.26	11.28	11.31	11.33	11.35	11.38	11.40	11.42	11.44
550	11.28	11.30	11.32	11.35	11.38	11.40	11.42	11.44	11.46	11.48
548	11.32	11.34	11.37	11.39	11.42	11.44	11.46	11.48	11.50	11.52
546	11.38	11.40	11.42	11.44	11.46	11.48	11.50	11.52	11.54	11.56
544	11.41	11.43	11.45	11.48	11.50	11.52	11.55	11.57	11.59	11.61
542	11.45	11.47	11.49	11.52	11.54	11.56	11.59	11.61	11.63	11.66
540	11.49	11.51	11.54	11.56	11.59	11.61	11.63	11.65	11.67	11.70
538	11.53	11.55	11.58	11.60	11.63	11.65	11.68	11.70	11.72	11.74
536	11.58	11.60	11.62	11.65	11.67	11.69	11.72	11.74	11.77	11.80
534	11.62	11.64	11.67	11.69	11.72	11.74	11.77	11.79	11.81	11.83
532	11.67	11.69	11.72	11.74	11.76	11.78	11.81	11.83	11.85	11.88
530	11.72	11.74	11.77	11.79	11.81	11.83	11.85	11.87	11.90	11.92
528	11.76	11.78	11.80	11.82	11.85	11.87	11.89	11.92	11.95	11.97
526	11.80	11.82	11.85	11.87	11.90	11.92	11.94	11.96	11.98	12.01
524	11.85	11.87	11.90	11.92	11.94	11.96	11.98	12.00	12.03	12.05
522	11.89	11.91	11.94	11.96	11.99	12.01	12.04	12.06	12.09	12.11
520	11.94	11.96	11.99	12.01	12.03	12.05	12.07	12.09	12.13	12.15
518	11.99	12.01	12.03	12.05	12.08	12.10	12.12	12.14	12.17	12.19
516	12.02	12.05	12.07	12.10	12.13	12.15	12.17	12.19	12.22	12.25
514	12.07	12.10	12.12	12.15	12.17	12.19	12.22	12.24	12.27	12.30
512	12.12	12.15	12.17	12.19	12.22	12.24	12.26	12.28	12.31	12.34
510	12.16	12.18	12.21	12.24	12.27	12.29	12.31	12.33	12.36	12.39
508	12.21	12.23	12.27	12.29	12.32	12.34	12.36	12.38	12.40	12.43
506	12.26	12.28	12.31	12.34	12.37	12.39	12.41	12.43	12.45	12.48
504	12.31	12.33	12.36	12.39	12.42	12.44	12.46	12.48	12.50	12.53
502	12.36	12.38	12.41	12.44	12.47	12.49	12.51	12.53	12.55	12.58
500	12.40	12.43	12.46	12.49	12.52	12.54	12.56	12.59	12.61	12.64
498	12.45	12.48	12.51	12.54	12.57	12.59	12.61	12.63	12.66	12.69
496	12.50	12.53	12.56	12.59	12.62	12.64	12.66	12.68	12.71	12.74
494	12.55	12.58	12.61	12.64	12.67	12.69	12.72	12.74	12.77	12.80
492	12.61	12.64	12.66	12.69	12.72	12.74	12.77	12.79	12.82	12.85
490	12.66	12.69	12.71	12.74	12.77	12.79	12.82	12.84	12.87	12.90
488	12.71	12.73	12.76	12.79	12.82	12.84	12.87	12.89	12.91	12.94
486	12.76	12.79	12.82	12.85	12.88	12.90	12.92	12.94	12.97	13.00
484	12.81	12.84	12.87	12.90	12.93	12.95	12.98	13.00	13.03	13.06
482	12.87	12.89	12.92	12.95	12.98	13.00	13.03	13.05	13.08	13.11
480	12.92	12.95	12.98	13.01	13.04	13.06	13.08	13.10	13.14	13.17
478	12.97	13.00	13.03	13.06	13.09	13.11	13.13	13.15	13.18	13.21

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	101	101.2	101.4	101.6	101.8	**102**	102.2	102.4	102.6	102.8
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600	10.55	10.57	10.59	10.61	10.63	10.65	10.67	10.70	10.72	10.74
598	10.59	10.61	10.63	10.65	10.67	10.69	10.72	10.74	10.76	10.78
596	10.62	10.64	10.66	10.68	10.70	10.72	10.74	10.76	10.78	10.80
594	10.66	10.69	10.71	10.73	10.75	10.77	10.79	10.81	10.83	10.85
592	10.69	10.71	10.73	10.75	10.77	10.79	10.81	10.83	10.85	10.87
590	10.72	10.74	10.77	10.79	10.81	10.83	10.86	10.88	10.90	10.92
588	10.77	10.79	10.81	10.83	10.85	10.87	10.89	10.91	10.93	10.95
586	10.80	10.82	10.84	10.86	10.88	10.90	10.93	10.95	10.97	11.00
584	10.83	10.85	10.87	10.89	10.91	10.93	10.95	10.97	11.00	11.03
582	10.87	10.90	10.92	10.94	10.96	10.98	11.00	11.02	11.04	11.06
580	10.91	10.94	10.96	10.98	11.00	11.02	11.04	11.06	11.09	11.11
578	10.95	10.98	11.00	11.02	11.04	11.06	11.08	11.10	11.12	11.14
576	10.98	11.01	11.03	11.05	11.07	11.09	11.11	11.14	11.16	11.18
574	11.02	11.04	11.06	11.08	11.10	11.13	11.15	11.18	11.20	11.22
572	11.08	11.11	11.13	11.15	11.17	11.19	11.21	11.23	11.25	11.27
570	11.11	11.13	11.15	11.17	11.19	11.22	11.24	11.26	11.28	11.30
568	11.15	11.17	11.19	11.21	11.23	11.25	11.27	11.29	11.31	11.33
566	11.20	11.22	11.24	11.26	11.28	11.30	11.32	11.34	11.36	11.38
564	11.24	11.26	11.28	11.30	11.32	11.34	11.36	11.38	11.40	11.43
562	11.27	11.29	11.31	11.33	11.35	11.38	11.40	11.42	11.44	11.46
560	11.30	11.33	11.35	11.37	11.39	11.42	11.44	11.46	11.48	11.50
558	11.35	11.37	11.40	11.42	11.44	11.46	11.48	11.50	11.52	11.55
556	11.39	11.41	11.44	11.46	11.48	11.51	11.53	11.55	11.57	11.59
554	11.42	11.44	11.46	11.48	11.50	11.52	11.54	11.56	11.58	11.60
552	11.46	11.48	11.52	11.54	11.56	11.58	11.60	11.62	11.64	11.66
550	11.51	11.53	11.55	11.57	11.60	11.62	11.65	11.67	11.69	11.71
548	11.54	11.56	11.58	11.60	11.63	11.65	11.67	11.69	11.71	11.73
546	11.58	11.60	11.62	11.64	11.67	11.69	11.71	11.73	11.75	11.77
544	11.63	11.65	11.67	11.69	11.72	11.75	11.77	11.80	11.82	11.84
542	11.68	11.70	11.72	11.74	11.77	11.80	11.82	11.85	11.87	11.89
540	11.72	11.75	11.77	11.79	11.82	11.84	11.86	11.88	11.90	11.93
538	11.76	11.79	11.81	11.84	11.86	11.88	11.90	11.92	11.94	11.97
536	11.82	11.85	11.87	11.89	11.91	11.93	11.95	11.97	11.99	12.01
534	11.85	11.88	11.90	11.93	11.95	11.97	11.99	12.01	12.03	12.06
532	11.90	11.93	11.95	11.97	11.99	12.01	12.03	12.05	12.07	12.10
530	11.94	11.97	11.99	12.02	12.04	12.06	12.09	12.11	12.13	12.16
528	12.00	12.02	12.05	12.07	12.09	12.12	12.14	12.16	12.18	12.20
526	12.03	12.06	12.08	12.10	12.12	12.15	12.17	12.20	12.22	12.24
524	12.07	12.10	12.12	12.15	12.17	12.20	12.22	12.25	12.27	12.29
522	12.13	12.15	12.18	12.21	12.23	12.26	12.28	12.30	12.33	12.35
520	12.17	12.20	12.22	12.25	12.27	12.29	12.32	12.34	12.37	12.39
518	12.22	12.25	12.28	12.31	12.33	12.35	12.37	12.40	12.42	12.44
516	12.27	12.30	12.32	12.35	12.37	12.40	12.42	12.45	12.47	12.49
514	12.33	12.36	12.38	12.41	12.43	12.45	12.47	12.49	12.51	12.53
512	12.36	12.39	12.42	12.44	12.47	12.50	12.52	12.54	12.56	12.58
510	12.41	12.44	12.46	12.49	12.51	12.54	12.56	12.58	12.60	12.63
508	12.45	12.48	12.50	12.53	12.55	12.58	12.60	12.63	12.66	12.68
506	12.50	12.52	12.55	12.57	12.60	12.62	12.65	12.67	12.70	12.73
504	12.55	12.58	12.60	12.63	12.65	12.68	12.70	12.72	12.75	12.79
502	12.60	12.63	12.65	12.67	12.70	12.73	12.76	12.78	12.81	12.83
500	12.66	12.69	12.71	12.74	12.76	12.79	12.81	12.84	12.86	12.89
498	12.71	12.74	12.76	12.78	12.80	12.83	12.85	12.88	12.90	12.93
496	12.76	12.78	12.80	12.83	12.85	12.88	12.90	12.93	12.96	12.99
494	12.82	12.84	12.86	12.89	12.91	12.94	12.96	12.99	13.01	13.04
492	12.87	12.89	12.91	12.94	12.96	12.99	13.01	13.04	13.06	13.09
490	12.92	12.94	12.97	13.00	13.02	13.05	13.07	13.10	13.12	13.15
488	12.96	12.98	13.01	13.04	13.06	13.09	13.11	13.14	13.16	13.19
486	13.02	13.04	13.07	13.10	13.12	13.15	13.17	13.20	13.22	13.25
484	13.08	13.10	13.13	13.16	13.18	13.21	13.23	13.26	13.28	13.31
482	13.13	13.15	13.18	13.21	13.23	13.26	13.28	13.31	13.33	13.36
480	13.19	13.21	13.24	13.27	13.29	13.32	13.34	13.37	13.40	13.44
478	13.23	13.25	13.28	13.31	13.33	13.36	13.38	13.41	13.43	13.48

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	103	103.2	103.4	103.6	103.8	**104**	104.2	104.4	104.6	104.8
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600	10.76	10.78	10.80	10.82	10.84	10.86	10.88	10.90	10.93	10.95
598	10.79	10.82	10.84	10.86	10.88	10.90	10.92	10.94	10.96	10.98
596	10.83	10.85	10.87	10.89	10.91	10.93	10.95	10.97	10.99	11.01
594	10.87	10.89	10.91	10.93	10.95	10.97	10.99	11.01	11.03	11.05
592	10.90	10.93	10.95	10.97	10.99	11.01	11.03	11.05	11.07	11.09
590	10.94	10.96	10.98	11.00	11.03	11.05	11.07	11.09	11.11	11.13
588	10.98	11.00	11.02	11.04	11.07	11.09	11.11	11.13	11.15	11.17
586	11.02	11.04	11.06	11.08	11.11	11.13	11.15	11.17	11.19	11.20
584	11.05	11.07	11.09	11.11	11.14	11.16	11.18	11.20	11.23	11.25
582	11.09	11.11	11.13	11.15	11.18	11.20	11.22	11.24	11.27	11.29
580	11.13	11.15	11.17	11.19	11.22	11.24	11.26	11.28	11.30	11.32
578	11.17	11.19	11.21	11.23	11.25	11.27	11.29	11.31	11.33	11.35
576	11.21	11.23	11.25	11.27	11.29	11.30	11.31	11.33	11.35	11.37
574	11.25	11.27	11.29	11.31	11.33	11.35	11.37	11.39	11.41	11.43
572	11.29	11.31	11.33	11.35	11.37	11.39	11.41	11.43	11.45	11.47
570	11.33	11.35	11.37	11.39	11.41	11.44	11.46	11.48	11.50	11.52
568	11.36	11.39	11.41	11.43	11.45	11.47	11.49	11.51	11.53	11.55
566	11.40	11.43	11.45	11.47	11.50	11.52	11.54	11.56	11.58	11.60
564	11.45	11.47	11.49	11.51	11.54	11.56	11.58	11.60	11.62	11.64
562	11.49	11.51	11.53	11.55	11.58	11.60	11.62	11.64	11.66	11.68
560	11.53	11.55	11.57	11.59	11.62	11.64	11.66	11.68	11.71	11.73
558	11.57	11.59	11.61	11.63	11.66	11.68	11.70	11.72	11.74	11.76
556	11.61	11.63	11.65	11.67	11.70	11.72	11.74	11.76	11.78	11.80
554	11.65	11.67	11.69	11.71	11.74	11.76	11.78	11.80	11.82	11.84
552	11.69	11.72	11.74	11.76	11.79	11.81	11.83	11.85	11.87	11.89
550	11.74	11.76	11.78	11.80	11.83	11.85	11.87	11.90	11.92	11.94
548	11.76	11.80	11.82	11.84	11.87	11.91	11.93	11.96	11.98	12.00
546	11.82	11.85	11.87	11.89	11.92	11.94	11.96	11.99	12.01	12.03
544	11.87	11.89	11.91	11.93	11.96	11.98	12.00	12.03	12.05	12.07
542	11.91	11.93	11.95	11.97	12.00	12.02	12.04	12.07	12.09	12.11
540	11.95	11.98	12.00	12.02	12.05	12.07	12.09	12.12	12.14	12.16
538	12.00	12.02	12.05	12.07	12.10	12.12	12.14	12.17	12.19	12.21
536	12.04	12.07	12.09	12.11	12.14	12.16	12.18	12.21	12.23	12.25
534	12.09	12.11	12.14	12.16	12.19	12.21	12.23	12.26	12.28	12.30
532	12.13	12.16	12.18	12.20	12.23	12.25	12.27	12.30	12.32	12.34
530	12.18	12.20	12.23	12.25	12.28	12.30	12.32	12.35	12.37	12.39
528	12.23	12.25	12.27	12.29	12.32	12.34	12.36	12.39	12.41	12.43
526	12.27	12.30	12.32	12.34	12.37	12.39	12.41	12.44	12.46	12.49
524	12.32	12.34	12.36	12.38	12.41	12.43	12.45	12.48	12.50	12.52
522	12.37	12.39	12.41	12.43	12.47	12.49	12.51	12.54	12.56	12.58
520	12.41	12.44	12.46	12.48	12.51	12.54	12.56	12.58	12.61	12.63
518	12.47	12.49	12.51	12.53	12.56	12.58	12.60	12.63	12.65	12.67
516	12.51	12.54	12.56	12.58	12.61	12.63	12.65	12.68	12.71	12.72
514	12.56	12.58	12.60	12.62	12.65	12.67	12.69	12.72	12.74	12.76
512	12.61	12.63	12.65	12.67	12.70	12.72	12.74	12.77	12.79	12.81
510	12.66	12.68	12.71	12.73	12.76	12.78	12.80	12.83	12.85	12.88
508	12.71	12.73	12.76	12.78	12.81	12.83	12.85	12.88	12.90	12.92
506	12.76	12.78	12.80	12.82	12.85	12.87	12.89	12.92	12.94	12.96
504	12.81	12.83	12.85	12.87	12.90	12.92	12.94	12.97	12.99	13.00
502	12.86	12.88	12.90	12.92	12.95	12.97	12.99	13.02	13.04	13.06
500	12.91	12.94	12.96	12.99	13.01	13.04	13.06	13.09	13.11	13.14
498	12.96	12.98	13.01	13.03	13.06	13.08	13.10	13.13	13.15	13.17
496	13.02	13.04	13.06	13.09	13.12	13.14	13.16	13.19	13.21	13.23
494	13.07	13.10	13.12	13.14	13.17	13.19	13.21	13.24	13.26	13.28
492	13.12	13.15	13.17	13.19	13.22	13.24	13.26	13.29	13.31	13.33
490	13.17	13.20	13.23	13.25	13.28	13.30	13.33	13.35	13.37	13.41
488	13.23	13.25	13.27	13.29	13.32	13.34	13.36	13.38	13.40	13.42
486	13.28	13.31	13.34	13.36	13.39	13.41	13.43	13.46	13.48	13.50
484	13.34	13.37	13.40	13.42	13.45	13.47	13.49	13.52	13.54	13.56
482	13.39	13.42	13.45	13.48	13.51	13.53	13.55	13.58	13.60	.....
480	13.45	13.48	13.50	13.53	13.56	13.58	13.60	13.63	.....	.....
478	13.51	13.55	13.57	13.60	13.63	13.65	13.67	.....	.....	.....

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	105	105.2	105.4	105.6	105.8	**106**	106.2	106.4	106.6	106.8
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600	10.97	10.99	11.01	11.03	11.05	11.07	11.09	11.12	11.14	11.16
598	11.01	11.03	11.05	11.07	11.09	11.11	11.13	11.15	11.17	11.19
596	11.03	11.05	11.07	11.09	11.11	11.13	11.15	11.17	11.19	11.21
594	11.07	11.09	11.11	11.13	11.15	11.17	11.19	11.21	11.23	11.25
592	11.11	11.13	11.15	11.17	11.19	11.21	11.23	11.25	11.27	11.29
590	11.15	11.17	11.20	11.22	11.24	11.26	11.28	11.30	11.32	11.34
588	11.19	11.21	11.23	11.25	11.27	11.29	11.31	11.33	11.35	11.37
586	11.22	11.24	11.26	11.28	11.30	11.32	11.34	11.37	11.39	11.41
584	11.27	11.29	11.31	11.33	11.35	11.37	11.39	11.41	11.43	11.45
582	11.31	11.33	11.35	11.37	11.39	11.41	11.43	11.45	11.47	11.49
580	11.35	11.37	11.39	11.41	11.43	11.45	11.48	11.50	11.52	11.54
578	11.37	11.39	11.41	11.43	11.45	11.47	11.49	11.51	11.53	11.55
576	11.39	11.41	11.43	11.45	11.47	11.49	11.51	11.53	11.55	11.57
574	11.45	11.47	11.49	11.51	11.53	11.55	11.57	11.59	11.61	11.63
572	11.49	11.51	11.53	11.55	11.57	11.59	11.61	11.63	11.65	11.67
570	11.55	11.57	11.59	11.61	11.63	11.66	11.68	11.70	11.72	11.74
568	11.57	11.60	11.62	11.64	11.66	11.68	11.70	11.72	11.74	11.76
566	11.62	11.64	11.66	11.68	11.70	11.72	11.74	11.76	11.78	11.80
564	11.66	11.68	11.70	11.72	11.74	11.76	11.78	11.80	11.82	11.84
562	11.70	11.72	11.74	11.76	11.78	11.80	11.82	11.84	11.86	11.88
560	11.75	11.77	11.80	11.82	11.84	11.86	11.89	11.91	11.93	11.95
558	11.78	11.80	11.82	11.84	11.86	11.88	11.90	11.92	11.94	11.96
556	11.82	11.84	11.86	11.88	11.90	11.92	11.94	11.96	11.98	12.00
554	11.86	11.88	11.90	11.92	11.94	11.96	11.98	12.00	12.02	12.04
552	11.91	11.93	11.95	11.97	11.99	12.01	12.03	12.05	12.07	12.09
550	11.97	11.99	12.01	12.03	12.06	12.08	12.10	12.12	12.14	12.16
548	12.02	12.04	12.06	12.08	12.10	12.12	12.14	12.16	12.18	12.20
546	12.05	12.07	12.09	12.11	12.13	12.15	12.17	12.19	12.21	12.23
544	12.09	12.11	12.13	12.15	12.17	12.19	12.21	12.23	12.25	12.27
542	12.13	12.15	12.17	12.19	12.21	12.23	12.25	12.27	12.29	12.31
540	12.19	12.21	12.23	12.26	12.28	12.30	12.32	12.35	12.37	12.40
538	12.23	12.25	12.27	12.29	12.31	12.33	12.35	12.37	12.39	12.41
536	12.27	12.29	12.31	12.33	12.35	12.37	12.39	12.41	12.43	12.45
534	12.32	12.33	12.35	12.37	12.39	12.41	12.43	12.45	12.47	12.49
532	12.36	12.38	12.40	12.42	12.44	12.46	12.48	12.50	12.52	12.54
530	12.42	12.44	12.46	12.49	12.51	12.53	12.55	12.58	12.60	12.62
528	12.45	12.48	12.50	12.52	12.54	12.56	12.58	12.60	12.62	12.64
526	12.51	12.53	12.55	12.57	12.59	12.61	12.63	12.65	12.67	12.69
524	12.54	12.56	12.58	12.60	12.62	12.64	12.66	12.68	12.70	12.72
522	12.60	12.62	12.64	12.66	12.68	12.70	12.72	12.74	12.76	12.78
520	12.66	12.68	12.70	12.73	12.75	12.78	12.80	12.83	12.85	12.87
518	12.69	12.71	12.73	12.75	12.77	12.79	12.82	12.84	12.86	12.88
516	12.74	12.76	12.78	12.80	12.82	12.84	12.86	12.88	12.90	12.92
514	12.78	12.80	12.82	12.84	12.86	12.88	12.90	12.92	12.94	12.96
512	12.83	12.85	12.87	12.89	12.91	12.93	12.95	12.97	12.99	13.01
510	12.90	12.93	12.95	12.98	13.00	13.02	13.05	13.07	13.10	13.12
508	12.94	12.96	12.98	13.00	13.02	13.04	13.06	13.08	13.11	13.13
506	12.98	13.00	13.02	13.04	13.06	13.08	13.10	13.12	13.14	13.16
504	13.03	13.05	13.07	13.09	13.11	13.13	13.15	13.17	13.19	13.21
502	13.08	13.10	13.12	13.14	13.16	13.18	13.20	13.22	13.24	13.26
500	13.16	13.19	13.21	13.24	13.26	13.29	13.31	13.34	13.36	13.39
498	13.19	13.21	13.23	13.25	13.27	13.34	13.36	13.38	13.40	13.42
496	13.25	13.27	13.29	13.31	13.33	13.35	13.37	13.39	13.42	13.44
494	13.30	13.32	13.34	13.36	13.38	13.40	13.42	13.44	13.46	13.48
492	13.35	13.37	13.39	13.41	13.43	13.45	13.47	13.49	13.51	13.53
490	13.43	13.46	13.48	13.51	13.53	13.54	13.56	13.61	13.63	13.66
488	13.44	13.51	13.53	.....	.....	.....	.....	.....	.....	.....
486	13.52	.....	.....	.....	.....	.....	.....	.....	.....	.....

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	107	107.2	107.4	107.6	107.8	108	108.2	108.4	108.6	108.8
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
600	11.18	11.20	11.22	11.24	11.26	11.28	11.30	11.32	11.34	11.36
598	11.21	11.23	11.25	11.27	11.29	11.32	11.33	11.35	11.37	11.39
596	11.23	11.27	11.29	11.32	11.34	11.36	11.38	11.40	11.43	11.45
594	11.27	11.31	11.33	11.35	11.37	11.40	11.42	11.44	11.46	11.48
592	11.31	11.35	11.37	11.39	11.41	11.43	11.45	11.48	11.50	11.53
590	11.37	11.39	11.41	11.43	11.45	11.47	11.49	11.51	11.54	11.56
588	11.39	11.43	11.45	11.47	11.49	11.51	11.53	11.56	11.58	11.60
586	11.43	11.47	11.49	11.51	11.53	11.55	11.57	11.60	11.62	11.64
584	11.47	11.50	11.52	11.54	11.57	11.59	11.61	11.64	11.66	11.68
582	11.51	11.54	11.56	11.58	11.60	11.63	11.65	11.67	11.70	11.72
580	11.56	11.58	11.60	11.63	11.65	11.67	11.69	11.71	11.74	11.76
578	11.57	11.62	11.64	11.66	11.69	11.71	11.74	11.76	11.78	11.80
576	11.59	11.66	11.68	11.70	11.72	11.75	11.77	11.80	11.82	11.84
574	11.65	11.70	11.72	11.74	11.77	11.79	11.81	11.84	11.86	11.88
572	11.69	11.75	11.77	11.79	11.81	11.83	11.85	11.88	11.90	11.92
570	11.77	11.79	11.81	11.83	11.85	11.88	11.90	11.92	11.94	11.96
568	11.78	11.83	11.85	11.88	11.91	11.92	11.95	11.97	11.99	12.01
566	11.82	11.87	11.89	11.91	11.94	11.96	11.98	12.01	12.03	12.06
564	11.86	11.91	11.94	11.97	11.99	12.00	12.02	12.05	12.07	12.09
562	11.90	11.95	11.97	12.00	12.02	12.04	12.07	12.09	12.12	12.14
560	11.98	12.00	12.02	12.04	12.06	12.09	12.11	12.13	12.15	12.18
558	11.99	12.04	12.06	12.08	12.10	12.13	12.15	12.17	12.20	12.22
556	12.02	12.08	12.10	12.13	12.15	12.17	12.20	12.22	12.24	12.27
554	12.06	12.13	12.15	12.17	12.20	12.22	12.25	12.27	12.29	12.31
552	12.11	12.17	12.19	12.21	12.23	12.26	12.29	12.31	12.33	12.35
550	12.19	12.22	12.24	12.26	12.28	12.31	12.33	12.35	12.38	12.40
548	12.22	12.26	12.28	12.30	12.33	12.35	12.37	12.40	12.42	12.45
546	12.25	12.31	12.33	12.35	12.37	12.40	12.43	12.45	12.47	12.49
544	12.29	12.35	12.37	12.40	12.42	12.44	12.47	12.49	12.51	12.54
552	12.33	12.40	12.42	12.44	12.47	12.49	12.52	12.54	12.56	12.58
540	12.42	12.44	12.47	12.49	12.51	12.54	12.56	12.58	12.60	12.63
538	12.43	12.49	12.51	12.53	12.56	12.58	12.61	12.63	12.65	12.67
536	12.47	12.54	12.56	12.58	12.60	12.63	12.66	12.68	12.70	12.73
534	12.51	12.58	12.60	12.62	12.65	12.68	12.71	12.73	12.75	12.77
532	12.56	12.63	12.66	12.68	12.70	12.72	12.74	12.77	12.79	12.81
530	12.65	12.68	12.70	12.72	12.75	12.77	12.80	12.82	12.84	12.87
528	12.66	12.72	12.74	12.77	12.79	12.82	12.84	12.86	12.89	12.91
526	12.71	12.77	12.79	12.82	12.85	12.87	12.89	12.91	12.94	12.97
524	12.74	12.83	12.85	12.87	12.89	12.92	12.95	12.97	12.99	13.02
522	12.80	12.87	12.89	12.92	12.94	12.96	12.98	13.01	13.03	13.05
520	12.90	12.92	12.94	12.97	12.99	13.02	13.04	13.07	13.09	13.11
518	12.91	12.97	13.00	13.02	13.04	13.07	13.09	13.11	13.14	13.17
516	12.95	13.02	13.04	13.07	13.09	13.12	13.15	13.17	13.19	13.21
514	13.00	13.08	13.10	13.13	13.15	13.17	13.20	13.22	13.24	13.27
512	13.06	13.13	13.16	13.18	13.20	13.22	13.24	13.27	13.30	13.32
510	13.15	13.17	13.20	13.22	13.25	13.27	13.30	13.32	13.35	13.37
508	13.20	13.23	13.25	13.27	13.30	13.32	13.35	13.37	13.40	13.42
506	13.26	13.29	13.31	13.33	13.35	13.38	13.41	13.43	13.45	13.47
504	13.33	13.35	13.37	13.39	13.41	13.43	13.46	13.48	13.50	13.52
502	13.27	13.40	13.42	13.44	13.46	13.48	13.51	13.53	13.55	13.57
500	13.41	13.44	13.46	13.49	13.51	13.54	13.56	13.59	13.61	13.63
498	13.45	13.47	13.49	13.51	13.53	.....	.....	.....	.....	.....
496	13.46	13.51	13.53	13.55	.....	.....	.....	.....	.....	.....
494	13.51	13.53	.....	.....	.....	.....	.....	.....	.....	.....
492	13.55	13.57	.....	.....	.....	.....	.....	.....	.....	.....
490	13.69	13.71	.....	.....	.....	.....	.....	.....	.....	.....

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	109	109.2	109.4	109.6	109.8	110	110.2	110.4	110.6	110.8
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600	11.39	11.41	11.43	11.45	11.47	11.49	11.51	11.53	11.55	11.57
598	11.41	11.43	11.45	11.48	11.50	11.53	11.54	11.55	11.57	11.60
596	11.47	11.49	11.51	11.53	11.55	11.57	11.60	11.62	11.64	11.66
594	11.50	11.52	11.54	11.56	11.58	11.61	11.63	11.66	11.68	11.70
592	11.55	11.57	11.59	11.61	11.63	14.65	11.67	11.70	11.72	11.74
590	11.58	11.60	11.62	11.64	11.66	11.68	11.71	11.73	11.75	11.77
588	11.62	11.64	11.66	11.68	11.70	11.72	11.74	11.76	11.79	11.81
586	11.66	11.68	11.70	11.72	11.74	11.76	11.78	11.81	11.84	11.86
584	11.70	11.72	11.74	11.76	11.78	11.80	11.82	11.85	11.87	11.89
582	11.74	11.76	11.78	11.81	11.83	11.85	11.88	11.90	11.92	11.94
580	11.78	11.80	11.82	11.84	11.86	11.89	11.91	11.93	11.95	11.97
578	11.83	11.85	11.87	11.89	11.91	11.93	11.95	11.98	12.00	12.02
576	11.87	11.89	11.91	11.93	11.95	11.97	12.00	12.02	12.04	12.06
574	11.91	11.93	11.95	11.97	11.99	12.01	12.04	12.06	12.08	12.11
572	11.95	11.97	11.99	12.01	12.03	12.05	12.07	12.10	12.12	12.14
570	11.99	12.01	12.03	12.05	12.07	12.10	12.12	12.14	12.16	12.18
568	12.03	12.06	12.08	12.10	12.12	12.14	12.16	12.18	12.21	12.23
566	12.08	12.10	12.12	12.14	12.16	12.18	12.20	12.22	12.25	12.27
564	12.12	12.14	12.16	12.18	12.20	12.22	12.24	12.27	12.29	12.31
562	12.17	12.19	12.21	12.23	12.25	12.27	12.30	12.32	12.34	12.36
560	12.20	12.22	12.24	12.26	12.29	12.31	12.33	12.36	12.38	12.40
558	12.25	12.28	12.30	12.32	12.34	12.36	12.38	12.41	12.43	12.45
556	12.29	12.32	12.34	12.36	12.38	12.40	12.43	12.45	12.47	12.49
554	12.33	12.35	12.38	12.40	12.42	12.44	12.46	12.49	12.51	12.54
552	12.38	12.40	12.42	12.44	12.46	12.49	12.51	12.54	12.56	12.59
550	12.42	12.44	12.47	12.49	12.51	12.54	12.56	12.58	12.60	12.63
548	12.47	12.50	12.52	12.54	12.56	12.58	12.61	12.63	12.65	12.68
546	12.51	12.54	12.56	12.59	12.61	12.63	12.65	12.68	12.70	12.72
544	12.56	12.59	12.61	12.63	12.65	12.67	12.70	12.72	12.74	12.76
542	12.61	12.63	12.65	12.67	12.70	12.72	12.74	12.76	12.78	12.80
540	12.65	12.67	12.70	12.72	12.74	12.77	12.79	12.81	12.84	12.86
538	12.70	12.72	12.74	12.76	12.79	12.81	12.84	12.86	12.89	12.91
536	12.75	12.77	12.79	12.82	12.84	12.86	12.88	12.90	12.93	12.95
534	12.79	12.81	12.84	12.87	12.89	12.91	12.93	12.95	12.98	13.00
532	12.84	12.86	12.88	12.91	12.93	12.96	12.98	13.00	13.03	13.05
530	12.89	12.91	12.94	12.96	12.98	13.01	13.03	13.06	13.08	13.10
528	12.94	12.96	12.99	13.01	13.03	13.06	13.08	13.11	13.13	13.15
526	13.00	13.02	13.04	13.06	13.08	13.11	13.13	13.15	13.18	13.20
524	13.04	13.07	13.09	13.12	13.14	13.16	13.18	13.20	13.23	13.25
522	13.08	13.11	13.13	13.16	13.18	13.21	13.23	13.25	13.28	13.30
520	13.14	13.16	13.19	13.21	13.24	13.26	13.28	13.31	13.33	13.35
518	13.19	13.22	13.25	13.27	13.29	13.31	13.33	13.36	13.38	13.40
516	13.24	13.26	13.29	13.31	13.33	13.36	13.38	13.41	13.43	13.45
514	13.29	13.31	13.34	13.36	13.38	13.41	13.43	13.45	13.48	13.50
512	13.35	13.37	13.40	13.42	13.44	13.47	13.49	13.51	13.53	13.55
510	13.39	13.42	13.44	13.47	13.49	13.52	13.54	13.56	13.59	13.62
508	13.44	13.47	13.49	13.52	.....	.....	.....	.....	.....	.....
506	13.50	13.52	13.55	.....	.....	.....	.....	.....	.....	.....
504	13.55	13.57	.....	.....	.....	.....	.....	.....	.....	.....
502	13.60	.....	.....	.....	.....	.....	.....	.....	.....	.....
500	13.66	.....	.....	.....	.....	.....	.....	.....	.....	.....

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.									
	111	111.2	111.4	111.6	111.8	112	112.2	112.4	112.6	112.8
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600	11.59	11.62	11.64	11.66	11.68	11.70	11.72	11.74	11.76	11.78
598	11.63	11.65	11.67	11.69	11.71	11.74	11.76	11.78	11.80	11.83
596	11.68	11.70	11.72	11.74	11.76	11.78	11.80	11.82	11.84	11.87
594	11.72	11.74	11.76	11.78	11.80	11.82	11.84	11.87	11.89	11.91
592	11.76	11.78	11.80	11.82	11.84	11.86	11.88	11.90	11.92	11.94
590	11.79	11.81	11.83	11.85	11.87	11.90	11.92	11.94	11.96	11.98
588	11.83	11.86	11.88	11.90	11.92	11.94	11.96	11.98	12.00	12.02
586	11.88	11.90	11.92	11.94	11.96	11.98	12.00	12.02	12.04	12.06
584	11.91	11.94	11.96	11.98	12.00	12.02	12.04	12.06	12.08	12.10
582	11.96	11.98	12.00	12.02	12.04	12.06	12.08	12.10	12.12	12.14
580	11.99	12.02	12.04	12.06	12.08	12.10	12.12	12.15	12.17	12.19
578	12.04	12.06	12.08	12.10	12.12	12.14	12.16	12.18	12.20	12.22
576	12.09	12.11	12.13	12.15	12.17	12.19	12.21	12.23	12.25	12.27
574	12.13	12.15	12.17	12.19	12.21	12.23	12.25	12.27	12.29	12.31
572	12.17	12.19	12.21	12.23	12.25	12.27	12.29	12.32	12.34	12.36
570	12.21	12.23	12.25	12.27	12.30	12.32	12.34	12.36	12.38	12.40
568	12.25	12.28	12.30	12.32	12.34	12.36	12.39	12.41	12.43	12.45
566	12.30	12.32	12.34	12.36	12.38	12.40	12.43	12.45	12.47	12.49
564	12.34	12.36	12.38	12.40	12.42	12.45	12.48	12.50	12.52	12.54
562	12.38	12.40	12.42	12.44	12.46	12.49	12.52	12.54	12.56	12.58
560	12.42	12.45	12.47	12.49	12.51	12.54	12.56	12.58	12.60	12.62
558	12.47	12.49	12.51	12.53	12.55	12.58	12.61	12.63	12.65	12.67
556	12.52	12.54	12.56	12.58	12.60	12.63	12.66	12.68	12.70	12.72
554	12.56	12.58	12.60	12.63	12.65	12.67	12.70	12.72	12.74	12.76
552	12.61	12.63	12.65	12.67	12.69	12.72	12.75	12.77	12.79	12.81
550	12.65	12.67	12.70	12.72	12.75	12.76	12.79	12.81	12.83	12.85
548	12.70	12.72	12.74	12.76	12.78	12.81	12.84	12.86	12.88	12.90
546	12.75	12.77	12.79	12.81	12.84	12.86	12.89	12.91	12.93	12.95
544	12.79	12.81	12.83	12.85	12.88	12.90	12.93	12.95	12.97	12.99
542	12.83	12.85	12.88	12.90	12.92	12.95	12.98	13.00	13.02	13.04
540	12.88	12.91	12.93	12.95	12.98	13.00	13.03	13.05	13.07	13.09
538	12.93	12.95	12.98	13.00	13.02	13.05	13.08	13.10	13.12	13.14
536	12.98	13.00	13.03	13.05	13.07	13.10	13.12	13.14	13.16	13.18
534	13.02	13.05	13.07	13.10	13.12	13.15	13.17	13.19	13.21	13.23
532	13.08	13.11	13.13	13.15	13.17	13.20	13.22	13.24	13.26	13.28
530	13.13	13.15	13.17	13.20	13.22	13.24	13.27	13.29	13.31	13.34
528	13.18	13.20	13.23	13.25	13.28	13.30	13.32	13.34	13.36	13.39
526	13.23	13.25	13.25	13.30	13.32	13.35	13.37	13.39	13.41	13.43
524	13.28	13.30	13.33	13.35	13.37	13.40	13.42	13.44	13.47	13.49
522	13.33	13.35	13.38	13.40	13.42	13.45	13.47	13.49	13.52	13.54
520	13.38	13.40	13.42	13.45	13.48	13.50	13.52	13.55	.....	.....
518	13.43	13.45	13.47	13.50	13.52	13.55	.....	.....	.....	.....
516	13.48	13.50	13.52	13.55	13.57	.....	.....	.....	.....	.....
514	13.52	.....	.....	.....	.....	.....	.....	.....	.....	.....

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TABLE 3.—*Percentages of nitrogen (N) corresponding to various weights of substance taken for analysis and to the volume of nitric oxide (NO) gas in the Lunge nitrometer corrected to standard conditions at 0° C. and 760 mm. pressure*—Continued.

Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.						Weight of substance taken, milligrams.	Corrected volume of nitric oxide, c. c.					
	113	113.3	113.4	113.6	113.8	114		113	113.2	113.4	113.6	113.8	114
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*		*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
600....	11.80	11.83	11.85	11.87	11.89	11.91	**560**....	12.65	12.67	12.69	12.71	12.74	12.76
598....	11.85	11.87	11.89	11.91	11.93	11.95	558....	12.70	12.72	12.74	12.76	12.78	12.80
596....	11.89	11.91	11.93	11.95	11.97	11.99	556....	12.75	12.77	12.79	12.81	12.83	12.85
594....	11.93	11.95	11.97	11.99	12.01	12.03	554....	12.79	12.81	12.83	12.85	12.87	12.90
592....	11.96	11.99	12.01	12.03	12.05	12.07	552....	12.84	12.86	12.88	12.90	12.92	12.94
590....	12.00	12.02	12.05	12.07	12.09	12.11	**550**....	12.88	12.90	12.92	12.95	12.97	12.99
588....	12.04	12.06	12.08	12.10	12.12	12.15	548....	12.93	12.95	12.97	12.99	13.01	13.04
586....	12.08	12.10	12.12	12.14	12.16	12.19	546....	12.98	13.00	13.02	13.04	13.06	13.09
584....	12.12	12.14	12.16	12.18	12.20	12.23	544....	13.02	13.04	13.06	13.08	13.10	13.13
582....	12.16	12.18	12.20	12.23	12.25	12.28	542....	13.07	13.09	13.11	13.13	13.15	13.18
580....	12.21	12.23	12.25	12.28	12.30	12.32	**540**....	13.11	13.14	13.16	13.19	13.21	13.23
578....	12.25	12.28	12.30	12.32	12.34	12.36	538....	13.16	13.19	13.21	13.24	13.26	13.28
576....	12.29	12.31	12.33	12.35	12.37	12.40	536....	13.20	13.23	13.25	13.27	13.29	13.31
574....	12.34	12.36	12.38	12.40	12.42	12.45	534....	13.25	13.27	13.29	13.31	13.33	13.36
572....	12.39	12.41	12.43	12.45	12.47	12.49	532....	13.31	13.33	13.35	13.38	13.40	13.43
570....	12.43	12.45	12.47	12.49	12.51	12.54	**530**....	13.36	13.39	13.41	13.43	13.46	13.48
568....	12.48	12.50	12.52	12.54	12.56	12.58	528....	13.41	13.44	13.46	13.48	13.51	13.53
566....	12.52	12.54	12.56	12.58	12.60	12.62	526....	13.46	13.49	13.51	13.53	13.55	.....
564....	12.57	12.59	12.61	12.63	12.65	12.67	524....	13.51	13.54	13.56	13.59	.....	.....
562....	12.61	12.63	12.65	12.67	12.69	12.71							

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